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Many Important Paper Controls Removed

War Production Board Makes Major Contribution To Peacetime Economy With Lifting of Restrictions On Production and Consumption of Paper—Newsprint Quota Increased 2.5% In Third Quarter.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 27, 1945—Restrictions on the use of paper by all branches of the printing and publishing industry, except newspapers, were removed by a War Production Board action lifting several restricting orders effective immediatley.

Books, magazines, commercial printing, greeting cards and illustrated post cards and wall paper, were among the items affected by the revocations. The majority of the orders concerned were issued in January, 1943, and limited the use, and required conservation of printing papers throughout the industry. They were claimed at the time to be necessary because of war shortages of pulp and paper. The end of the war, with decreased military and foreign requirements, combined with importation of pulp, has now made it possible to revoke these orders, except as to the newspaper publishing industry which still is limited in its supply of newsprint and restricted in usage under L-24, the newspaper order.

Recognizing the continued shortage of newsprint, WPB now is considering an amendment to the newspaper order that would extend control to include newsprint users other than newspaper publishers and limit their usage of newsprint to the level permitted under their respective control orders at the time of revocation.

Controls on Converted Items Off

WASHINGTON, D. C., August 24, 1945—All quantity restrictions on the manufacture of a large variety of converted paper and paperboard products, including a number of industrial, commercial and household papers in short supply, have been removed, the War Production Board stated today.

With the revocation of the paper and paperboard conservation Order (M-241-a), announced today, increased supplies of such items as toilet paper, facial tissue, paper towels, napkins, drinking straws and waxed paper should be forthcoming, WPB said. Other converted paper products, previously limited to a percentage of normal production, but now unrestricted, are Venetian blinds, window shades, draperies, paper carpets and rugs and retail packages of wrapping paper.

WPB officials said that the order was revoked because it was no longer necessary to the manufacture and distribution of certain paper products for military and essential civilian requirements. Industry appears ready to increase the production of most of these products and indications are that adequate paper is available. WPB said it had been requested by many manufacturers to increase their heretofore limited quotas. Any liabilities incurred for violation of M-241-a, or actions taken by WPB under the order, are still in effect, WPB pointed out.

Newsprint Quota Increased

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 29, 1945—Newspaper publishers may increase their third-quarter 1945 consumption of print paper by 2.5% of their current third-quarter consumption quota, provided the tonnage so consumed is deducted from permitted fourth-quarter consumption, the War Production Board Printing and Publishing Division announced today.

This was effected by Direction 6 to the Newspaper Limitation Order (L-240) issued today.

Increased circulation requirements in this quarter prompted the action, WPB said. The provisions of the direction will not increase the over-all newsprint usage in the last six months of this year, it was pointed out.

More Paper Bags Soon

WASHINGTON, D. C., August 29, 1945—Increased supplies of grocers', variety and novelty bags should soon be available to the general public and paper shipping sacks available to industrial users, the War Production Board Paper Division announced today.

The three orders controlling production of these containers have been revoked. They were: L-261 (grocers' and variety bags), L-304 (specialty bags) and L-279 (paper shipping sacks).

At the same time WPB announced the removal of controls on the manufacture and use of steel insect-screen wire cloths, cork and cork products and asbestos textiles.

All these revocations are effective immediately except that covering asbestos textiles, which goes into effect August 31.

The order controlling grocers' and variety bags (L-261), designed to conserve both pulp and paper, restricted their manufacture to specified types and limited the inventories of makers, dealers and users. It was this type of paper bag that ran short during the war, necessitating the use of other types of containers and wrapping.

The manufacture of certain specialty paper bags, including the so-called bottle carry-out bags, was prohibited by Order L-304 in the interest of conserving pulp and paper, but all control is now removed.

The paper shipping sack order L-279 covered single wall, duplex or multiwall paper sacks designed for

(Continued on page 24)

Suggest Making Wolf River A PWA Project

Paper Men At Conference Discuss Benefits of Flood Control and Improvement of Sanitary Conditions — Pulp Imports A Serious Problem — Chinese Technical Man Now In U. S. — Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., August 27, 1945—Suggestion that the Wolf River project, which several years ago failed to win the sanction of army engineers as a flood control undertaking, might be given support as a public works program, was made Monday, August 20, by Senator Robert M. LaFollette after a discussion with representatives of agriculture, industry and municipalities. The conference was held at Riverview Country Club.

Among the benefits cited for the project were: Flood control; improvement in sanitary conditions, which are especially bad when the river is at low level in the fall; and constant flowage if water were stored in the spring for release throughout the summer. The Wolf is a tributary of the Fox River, major source of power for many paper mills. The project contemplates a number of dams and reservoirs, the first of which would be built at Lily, Wis. because the site for the dam would be narrowest there, and the cost of the land would not be great.

Paper mill executives who attended the conference were J. L. Sensenbrenner, Neenah, Wis., assistant secretary-treasurer of Kimberly-Clark Corporation and C. R. Seaborne, vice president of the Thilmany Pulp and Paper Company, Kaukauna, Wis. Another at the meeting was Dr. W. M. Van Horn of the Institute of Paper Chemistry, Appleton.

Importation of Pulp a Serious Problem

Importation of pulp presents a serious problem to Wisconsin's paper industry, Congressman Reid Murray told labor representatives August 21 at one of a series of conferences held at the Portage county courthouse at Stevens Point, Wis. He declared that Congress plans to give the problem "real consideration" and promised to do his utmost to see the state's paper industry is protected.

Place War Workers in Other Jobs

About two-thirds of the 359 persons employed in the Kimberly-Clark Ordnance division at Neenah Wis., which ceased war production Thursday, August 16, have been placed in other jobs in the corporation's mills or will be placed upon completion of close-up work at the plant, officials have announced. A number have resigned, and the personnel departments are trying to place as many as possible in other mills of the corporation.

Consolidated Ships Ice to West

Thirty-five hundred tons of ice, cut and stored last winter by the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., were shipped recently to a western firm for purposes of fruit preservation. The food industries have experienced a critical shortage of cooling facilities, and many firms such as breweries, have manufactured ice as a side line to help the country's food supply, a company spokesman said.

Consolidated stored the ice for possible use as a cooling medium for acid make-up water at a time when there appeared to be a possibility of a shortage in city water. However, the city now has ample volume for industrial use.

James Shattuck Edits K.-C. Magazine

James Shattuck has succeeded his father, S. F. Shattuck, as editor of Cooperation, Kimberly-Clark's news magazine for employes in its mills and for employes of the International Cellucotton Products Company

Additional members of the editorial staff for the main office are Mary Kay Adrian, Norma Brazeau, Bob Ryan, Roseanne Heckel, Virginia Raeiche, John Stolla, Gordon Welch and Betty L. Wilcox, while additional members on the staff for the Lakeview mill are Marjorie Stilp, Lula Bowles, George Larson, Eleanor Buxton and LaVahn Ballard. No new names have been added to the staff for Badger-Globe. Added to the Kimberly, Wis., mill editorial staff are Jayne Smith, Gen Van Lankveldt, Paul Albers and Orville Kriese.

Farm Committee in Forestry Work

A permanent committee of five was appointed to work out a program of forestry activities for conservation clubs at the Conservation and Forestry camp sponsored for Wisconsin Valley educators by the United States Forest Service. The camp was held August 20 to 22 at Eagle River, Wis.

A resolution was adopted suggesting establishment of a Major Richard I. Bong conservation fund to provide an adequately trained man to coordinate school and youth group conservation activities. The fund would honor the memory of the nation's leading ace in World War II, who died recently in an airplane accident. The educators also voted for an annual camp, as a valuable help in teaching conservation. Sixty persons were registered at the camp.

E. B. Hurst, of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., and a director of Trees for Tomorrow, Inc., pointed out that it is to everyone's interest to take an active part in conservation and forestry. M. N. Taylor, Merrill, Wis., executive director of Trees for Tomorrow, announced the second annual $2,500 forestry scholarships. Talks and demonstrations were given by representatives of the United States Forest Service, state conservation department and representatives of the Wisconsin College of Agriculture.

Chinese Technical Man in U. S.

Cheng Ke-jen, a Chinese technical expert, is at the Nekoosa-Edward Paper Company's mill at Port Edwards, Wis., to spend a year in studying the pulp and papermaking industry. He was sent there by the Chinese government after passing rigid tests, and was one of two selected, the other now studying the industry in West Virginia.

He declared that there were only two mechanical paper-making mills in China during the war. Those had a capacity of six tons a day, as compared to a normal peacetime operation of between 250 and 300 tons daily by a mill such as that of Nekoosa-Edwards.

(Continued on page 24)

Midwest Hopeful For Unrestricted Industry

Current Market Opinion Sets October As Earliest Anticipated Date For Complete Removal of Industry Controls — Tribune's Paper Mills Plan Extensive Improvements — Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., August 27, 1945—Reliable sources in the Chicago area do not expect the pulp and paper industry to be out from under wartime controls until October 1 or possibly January 1. To date there has been no noticeable effect on the trade as a result of the termination of the war but, naturally, a lot of "talk". Most of those interviewed here are awaiting the various advisory committee conferences which are reported to be slated for Washington between August 30 and September 6 when consultations will determine where the industry goes from here, in its first step toward reconversion.

The industry has no retooling or reconversion problem comparable to many other industries, but it does have an exhausted inventory and manpower situation which is causing the trade here som real worry. As far as price controls are concerned the industry expects them to clarify themselves as production improves. As far as production is concerned, reliable sources here seem quite willing for production to stay on for awhile—in the matter of weights anyway. There is a feeling that if the restrictions are pulled off now there will be a definite cheapening of the price structure in a number of lines.

Jobber-wise, the trade locally has a million wants to fill and will be definitely "in the market" from now on. Belief is that the industry, fiercely competitive, will do a far better production job than anticipated if impeding controls are thrown off at the proper time and if specific attention is given at once to manpower and tax determents.

Censure New Newsprint Plan

In an editorial headed "The Last Straw," the Chicago Tribune takes a heavy punch at recent newsprint commitments of the United States. After reciting the brilliant record of American industry during the War, it states, "Mills have been ordered by the Canadian administrator of newsprint (Canadian mills, of course) to use part of its capacity to manufacture pulp for Australia, and newsprint to be turned over to the French supply council. While Canada makes almost all of the newsprint manufactured on this continent, an equally large percentage of the production is used in the United States. In the close cooperation during the war between the governments of Canada and the United States, Canadian authorities entrusted to the WPB in this country the distribution of newsprint and cooperated with the WPB in carrying out its plans. The latest diversion order originated in Washington, not in Ottawa.

"This is a little too much. It is bad enough to have had taken from us the product of our industry, enterprise, and effort in order to give it to other newspapers in this country which lacked similar foresight. To take our production and ship it abroad is carrying socialism and socialistic conditions far beyond the bounds of reason. The grievance, obviously, is not ours alone; it is one of every American newspaper. The more production is diverted from the mills that normally serve the United States, the longer American newspapers will have to suffer from a newsprint shortage."

Tribune's Paper Mills Plan Improvements

The Chicago Tribune reported this week plans for a big expansion of its two paper plants, the Ontario Paper Company and its subsidiary, the Quebec North Shore Paper Company, both in Canada. The improvement program is to cost approximately four and one-half million dollars and provide a great deal of "reconversion" employment. Expenditures are designed to "speed up production, increase output, reduce costs, improve quality and to finance research including possibilities of new uses for the by-product, alcohol, and extraction of needed substances from waste materials."

It is reported that about $2,800,000 will be spent by Quebec North Shore at the Baie Comeau mill with $1,700,000 to be spent by Ontario Paper Company at the Thorold, Ontario, mill.

The Baie Comeau outlay will represent around $950,000 for new winders and grinders, and improved electric drive, extensions to storage space and increase in fresh water capacity. A digester for the production of sulphite pulp is also on the improvement program. The Ontario proposals include over half a million dollars for research, $500,000 on hydraulic, electrical and mechanical equipment and other improvements expected to materially increase annual output of newsprint. Actual tonnage increases expected from both mills show 33,000 tons of newsprint, 12,000 tons of wrapping paper, 5,500 tons of sulphite pulp and 13,000 tons of groundwood paper.

Paper Leaders Quoted on Reconversion

Two Chicago business leaders closely identified with the paper and pulp industry made significant comments concerning their reconversion problem in a recent symposium published by the Chicago Journal of Commerce. Walter P. Paepcke, president of the Container Corporation of America, said "Our operating plans will not be altered other than that containers of wartime specifications will be replaced by peacetime containers made specifically for domestic business. Those customers with more difficult reconversion problems will naturally be delayed in ordering packages for peacetime operations but a great majority of customers should be in position to resume peacetime activities promptly as, for example, manufacturers of all food products, wearing apparel, tobacco, soaps and matches".

The comment of J. P. Weyerhaeuser, executive vice president of the Weyerhauser Timber Company, were "We have no reconversion program in our lumber, pulp or plywood operations. When the War's end provides additional employes and especially those with the peculiar skills needed in logging, and government controls are relaxed, we will immediately begin building inventories of all kinds and serving prewar markets.

Whiting to Enlarge Lyman Plant

HOLYOKE, Mass., August 25, 1945—Plans for the installation of a new air dryer, the largest one of its type in this area, are announced today by officials of Whiting and Company. This new piece of equipment will be built in the middle wing of the plant, formerly the Lyman Mills. It will be 288 feet long and 14 feet wide. The drier will be made by the Industrial Air Corp. of Westwood from designs prepared by the Whiting firm engineers.

A tunnel will be built from the west end of the present machine room across to the middle wing. Through this will be rolled the finished paper to the new air drier.

The total installation will cost about $100,000, it was estimated today.

According to Edward C. Whiting, head of the company, and Charles Davidson, Jr., general manager, the new drier will increase the plant's output of higher grade paper with cockle finish.

Whiting & Co., known in local paper mill circles as Whiting No. 3, has two fourdrinier machines, each 114 inches wide. The machine room has been recently repainted.

A new air-conditioned laboratory is being installed off the main offices on Lyman street.

Upson Readies for New Products

LOCKPORT, N. Y., August 27—The Upson Company, manufacturer of board specialties, has completed plans for an addition to its stockhouse and is making other extensive improvements in the mill and various departments. A 150-ton hydrapulper is to be installed this fall and also a large special mixing chest and accessory equipment. Plans are also underway for the early installation of new turbine and boilers to be installed when delivery is possible.

A new coating building has just been completed and new coating equipment has been installed and is now in operation. Other plans for new equipment for peace time products are underway. Several new products developed by the company's Research Department will be ready for the market early in 1946.

Dilts Machines in New Installations

FULTON, N. Y.—The St. Regis Paper Company at its Harrisville and Norfolk plants, and the Taggart Corporation at its Oswego and Carthage plants, have placed orders for four Dilts hydrapulpers for use in the preparation of their quality papers. The 20-foot diameter hydrapulper to be installed at the Oswego plant will be designed to handle kraft pulp at the rate of upwards of 300 tons per day.

Brown Company of Berlin, N. H. has placed an order for three additional Dilts hydrafiners to supplement the ten hydrafiners now in use in the production of quality grades of papers produced at Berlin.

The hydrafiners are only a part of extensive postwar plans being projected by Brown company.

W. E. Gallagher Made Manager

The directors of The American Paper Goods Company have appointed Wallis E. Gallagher as general sales manager. For the last eleven years Mr. Gallagher has been connected with the paper industry, the last three years as general manager of St. Marys Kraft Corporation at St. Marys, Ga. Prior to that he served for six years as vice-president and treasurer of National Cellulose Corporation of New York.

K-C Starts New Laboratory

NEENAH, Wis., August 27, 1945—Construction has started here on what may eventually become the most extensive commercial technical laboratory in the paper industry, it was revealed this week in a report by the Kimberly-Clark Corporation which emphasized the program as company "insurance" that its employes will have steady postwar security.

The first step, involving extensive repairs of an existing building which had been out of use since 1930, will provide 60,000 square feet of added space. In addition to eight permanent control laboratories at operating mills of Kimberly-Clark, the company now has research laboratories at three different locations. When the new laboratory reaches its ultimate plan, the corporation's research and development facilities will be increased to provide centralized facilities for 160 scientists and additional research and development personnel.

H. A. Rothchild, long time technical director for Kimberly-Clark, will direct the new facilities.

Highland Continues Tablet Output

HOLYOKE, Mass., August 25, 1945—Highland Manufacturing company will be one of the local concerns affected by government cutbacks. The local firm, subcontractor to a New York corporation, had a contract for 400,000 stenographic pads for the government and had not received confirmation of the rumored contract termination. They have manufactured 200,000 pads to date.

Highland Manufacturing company has been under government contract for two and one half years and has been devoting only 20 per cent of production to civilian use. The concern, employing 50 workers, has not released any employes. Following contract termination, the Highland will continue to make pads, tablets, school supplies for department stores, private industry and civilian use.

Australian Paper Men Visit Canada

MONTREAL, Que., August 27, 1945—Three Australian paper men have been visiting Montreal studying Canadian methods of production in connection with expansion plans of Australia's fine paper production. They had travelled across Canada from the Pacific and have been visiting plants in the neighborhood of Montreal before going to the United States for three months.

Henry B. Somerset, who is director and general superintendent of the Associated Pulp and Paper Mills at Burnie, Tasmania, said this company, established in 1938, was virtually the sole source of supply in Australia for fine paper during the war. At present it produces 75 tons a day, but the output is planned to be raised to 100 tons. With him are J. J. Graham, a technical assistant, and D. Neilsen, construction engineer.

They stated that the distinctive feature about the Associated Mills is that its basic pulp comes from the eucalyptus tree. In America imported eucalyptus is known under the name Tasmanian Oak and eucalyptus grown in the United States as California Blue Gum.

Putnam on Bosch Board

SPRINGFIELD, Mass., August 25, 1945—Roger L. Putnam, chairman of the board of the Package Machinery company, has been elected a director of the American Bosch corporation.

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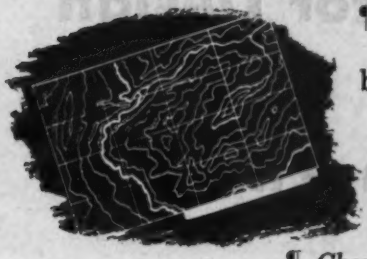

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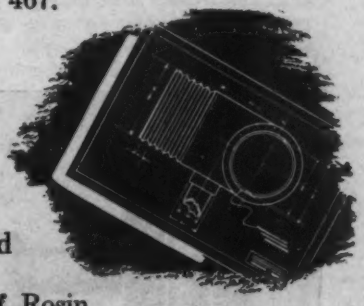

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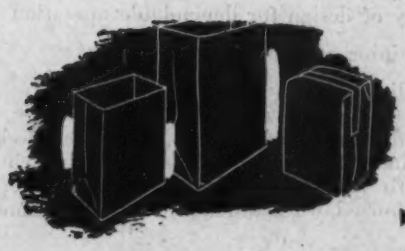

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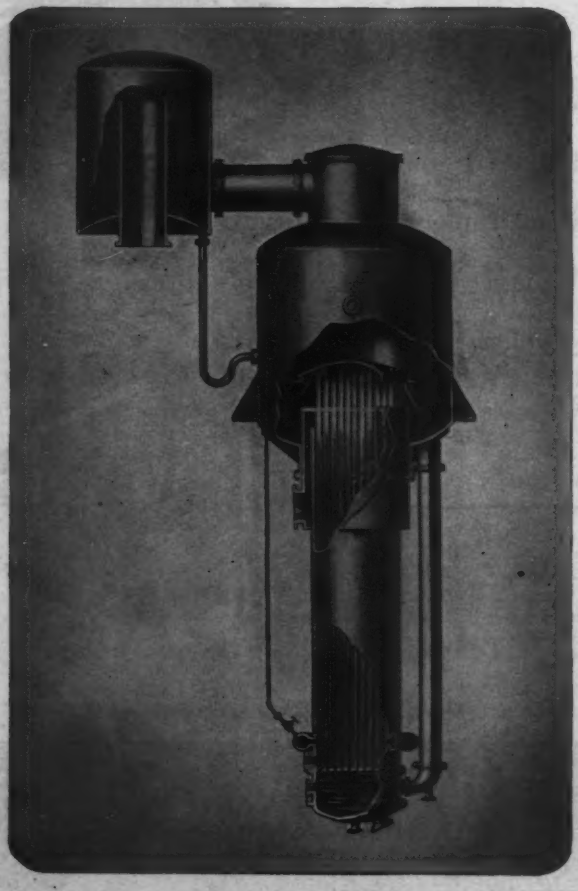

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Praises Containerboard Industry

WASHINGTON, D. C., August 29, 1945—The War Production Board today commended the containerboard industry as "an outstanding example of industrial ingenuity and cooperation in meeting the overwhelming military and civilian requirements for heavy fiber shipping and packaging materials during the war in the face of serious manpower and pulp shortages."

Stating that solid fiber "V" boxes were being produced at the rate of approximately 1,080,000 tons per year on equipment that in the best pre-war year converted less than half that amount, WPB said this record leads it to believe the industry will resolve any bottlenecks in reconversion, making it unnecessary to reinstate any of the controls recently revoked.

Outstanding production records were also achieved by corrugated container and fiber drum manufacturers, WPB said.

Commenting on the recent revocation of the containerboard limitation order, Paperboard Division officials said:

Conservation Order M-290, controlling the use, receipt, delivery and inventories of containerboard, issued early in 1943 and amended several times, was designed to meet military requirements and provide an equitable distribution of containerboard among container manufacturers and other users. In addition, it assured an adequate supply of waterproof raw materials for the "V" box program, which provided special weatherproof containers for overseas shipments and storage of vital war materials.

In conjunction with the fiber shipping container orders P-146 and L-317, Order M-290 was largely responsible for the excellent distribution of containerboard, a critically short commodity, making it available for both military and essential civilian requirements.

Smith Heads Monsanto Exports

ST. LOUIS, Mo., August 24—Appointment of Arnold H. Smith as Director of the Foreign Department of Monsanto Chemical Company, succeeding Herbert M. Hodges, was announced today by Charles Belknap, President of the Company.

The promotion becomes effective on October 1, when Mr. Hodges reaches the age of retirement. However, he will remain with the Company with the title of Overseas Director until completion of a special mission to China, India and South Africa, and will then return to his native England with his long and interesting business career at an end.

Mr. Smith, a native of Akron, will be succeeded as Assistant Director of the Foreign Department by Marshall E. Young, formerly General Export Manager, who will accompany Mr. Hodges on his mission to open Monsanto agencies and appoint Monsanto representatives in the countries visited.

Joe Scheuermann Heads Camachine Sales

W. B. Wilshusen, President of Cameron Machine Company, builders of Camachine winders, rewinders and slitters, has appointed Joseph Scheuermann as sales manager of the company. Scheuermann has been with the Company for almost twenty years. For the greater part of that time he served as salesman in the Mid-West and Pacific Coast territories. More recently, until his appointment as sales manager, he acted as mid-west sales manager.

Collins Ready to Go Ahead

NORTH WILBRAHAM, Mass., August 27, 1945—The possibility of war order cancellations at Collins Manufacturing company here will in no way interrupt the work schedule, according to an announcement made by Paul C. Bast, vice-president.

Since the start of the war the local mill has been busy manufacturing paper for the navy department, and as no reconversion is necessary, the plant is now ready to take care of a large backlog of commercial orders.

No reduction in the number of employes is planned, Bast said; in fact additional permanent employes have been hired the past past few weeks, and several others are to be taken on.

Provisions have been made to immediately rehire former employes now in service as they return to civilian life.

Several new developments at the plant will hasten the handling of the commercial business and the general overall picture is bright, Bast said.

Seek to Change Powell River Articles

VANCOUVER, B. C., August 20, 1945—Shareholders of the Powell River Company have been asked to approve certain revisions in the articles of the Association of the company. The matter will be considered at an extraordinary general meeting of the shareholders which is being held in mid-August. The alterations proposed include a change giving greater authority to the directors for the disposal of stock.

Associates Honor Schulkind

David W. Schulkind, President of the E. P. Lawson Co., was honored by his associates at a luncheon at the Hotel Pennsylvania recently in celebration of his 35 years in the paper cutting machinery and bindery equipment business. The E. P. Lawson Co. is at present engaged in the production of the new Lawson paper cutter which will make its appearance on the market in the near future. At the luncheon meeting, progress reports were made by the engineering staff of the various models that will be manufactured under the Lawson trademark. The design is under the direction of Lawson's Chief Engineer, Fred W. Seybold, who was formerly Chief Engineer of the Seybold Machine Company and who served in the same capacity with American Type Founders, Inc. until August 1st of this year.

Powell River Newsprint Up

POWELL RIVER, B. C.—Increase of 15 per cent in production of newsprint during the first half of 1945 over the same period last year is reported by the Powell River Company. At the same time there was an increase of 5 per cent in output of other paper and pulp products and an increase of 22 per cent in the production of lumber. These gains were accomplished despite a decline of 11 per cent in log output. The company produced 89,833 tons of newsprint and 35,463,000 board feet of lumber.

Sweatt on M. and O. Board

R. H. M. Robinson, chairman of the Board of Minnesota and Ontario Paper Company, announces that Harold W. Sweatt, president of Minneapolis Honeywell Regulator Company, has been elected a director of the paper company.

ADVENTURES IN THE "MARGIN OF EXPERIENCE"

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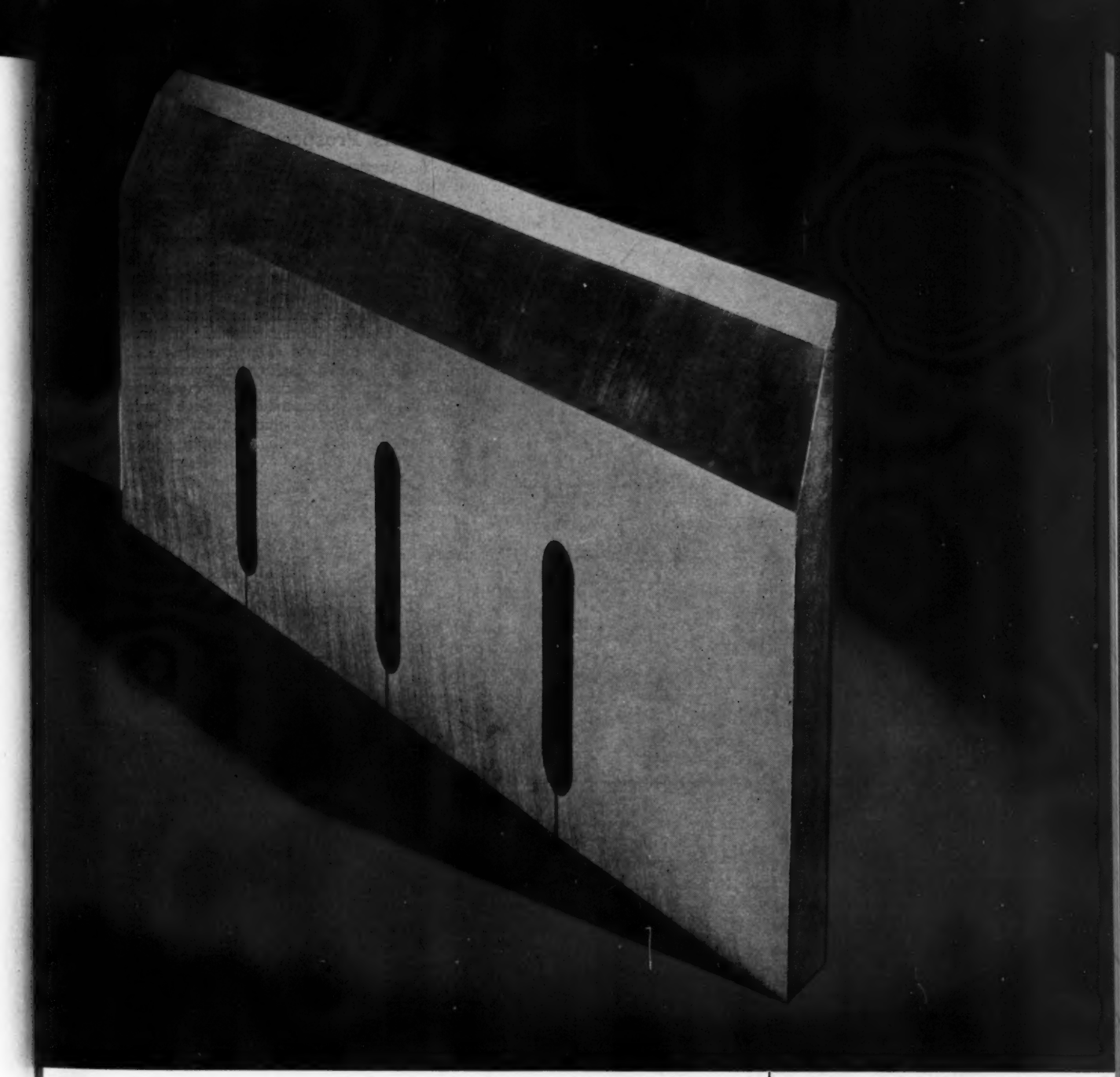


Simple arithmetic dictates

Anyone who adds up the many advantages of using Heppenstall Chipper Knives—mills that keep close check on the cost of chipping logs—must reach one irrefutable answer . . . *Heppenstall E.I.S. Chipper Knives show a unit cost below any other brand on the market.*

This fact has been thoroughly demonstrated over a period of many years and Heppenstall *guarantees* that in *your* mill under *your own* operating conditions, their knives will perform better and more economically than any other make. What more can you ask? Write for quotation. Heppenstall Company, Pittsburgh, Pa.

HEPPENSTALL

E.I.S. CHIPPER KNIVES

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending August 24, 1945

STOCKS	High	Low	Last
A. P. W.	6½	5⅞	6½
Armstrong Cork Co.	48½	47¾	48½
Celotex Corp.	18	16⅝	17⅞
Celotex Corp., pf.	21⅛	20⅞	20⅞
Certain-Teed Products Corp.	12½	11⅝	12⅜
Certain-Teed Products Corp., pf.	166½	164	166½
Champion Paper & Fibre Co.	35⅜	33⅞	35⅜
Champion Paper & Fibre Co., pf.	....	....	....
Congoleum-Nairn Co.	30¾	28¾	30¾
Container Corp. of America	28¾	27½	28¾
Continental-Diamond Fibre Co.	12⅞	12⅛	12½
Crown-Zellerbach Co.	24⅝	23	24⅜
Crown-Zellerbach Co., pf.	103	102⅛	102⅜
Dixie Cup Co.	28½	25¾	28½
Dixie Cup Co.—A	48	47	48
Flintkote Co.	31½	29	31⅛
Flintkote Co., pf.	109	108½	108½
Robert Gair	6½	6⅛	6½
Robert Gair, pf.	18	17⅞	18
International Paper Co.	28⅝	26½	28½
International Paper Co., pf.	98¾	97½	98
Johns-Manville Corp.	128½	121½	128½
Johns-Manville Corp., pf.	122	118¼	122
Kimberly-Clark Corp.	49½	47½	47½
MacAndrews & Forbes	....	....	....
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	44	42¼	43⅜
Mead Corp.	17¼	15	17¼
Mead Corp., pf. A—6%	....	....	....
Mead Corp., pf. B—5½%	103	101⅛	102¾
National Container Corp.	15¼	14	15¼
Paraffine Companies, Inc.	69½	66¾	67
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	21	18⅞	20¾
Rayonier, Inc., pf.	37⅛	36½	36¾
Ruberoid Co.	39½	38½	39½
Scott Paper Co.	54	54	54
Scott Paper Co., pf.	112¾	112	112
Sutherland Paper Co.	35	35	35
Union Bag & Paper Corp.	20½	17½	20⅛
United Paperboard Co.	7	6¾	7
U. S. Gypsum Co.	95	91	95
U. S. Gypsum, pf.	190¼	190¼	190⅛
West Virginia Pulp & Paper Co.	29¾	29½	29¾
West Virginia Pulp & Paper Co., pf.	110½	110½	110½

BONDS			
Abitibi Pulp & Paper Co., 5s '53	102	102	102
Celotex Corp. 3¾s '55	....	....	....
Certain-Teed Products Corp. 5½s '48	....	....	....
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	108⅜	108⅛	108⅛
International Paper Co. 5s '47	....	....	....
Mead 3½s '53	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending August 24, 1945

STOCKS	High	Low	Last
Great Northern Paper Co.	39	38½	39
Hummel-Ross Fibre Corp.	9¼	8¾	9¼
St. Regis Paper Co.	7⅜	6⅛	7⅛
St. Regis Paper Co., pf.	....	....	....
Taggart Corp.	6¼	6⅛	6⅛

Corrugated Box to Redeem Shares

TORONTO, Ont., August 27, 1945—Shareholders of Corrugated Paper Box Company at a general meeting recently gave unanimous approval to redeeming the outstanding $674,000 7 per cent preferred shares and the 2,691 income funding rights, which will be refunded by an issue of $300,000 3¼ per cent 7-year serial bonds, and $450,000 cumulative redeemable sinking fund 5% preference stock.

The bond issue has been sold privately, but the shareholders of record of Aug. 4 had the right to subscribe for the new 5 per cent shares up to and including Aug. 7. The issue of preference shares is being offered by Fry & Company.

Offers Rayonier Common Stock

Rayonier, Inc., common stock in the amount of 20,000 shares was offered in a secondary distribution by Blyth & Co. at a fixed price of $21 a share. Dealers' discount was announced at 50c a share.

N. Y. Mills' Prospects Bright

COHOES, N. Y., August 27, 1945—Bright prospects for the post-war period exist in this section and the majority of paper mills will continue to operate at full time with no reduction in forces. F. C. Huyck & Sons, Rensselaer, are planning to increase their force which now amounts to about 950 hands. It was stated that the firm has no reconversion problems as far as machinery is concerned and there will be no reduction in overtime schedules. The mill has orders ahead and will resume its former schedule of producing blankets for civilian use. The firm has been manufacturing blankets and felts for the government.

Announcement is made that the Warrensburg Paper and Pulp Company, operated by Isadore Baum & Son, is making preparations to change their product after having operated on government supplies since assuming control. The firm stated that there are more orders on hand than they can handle for three branches and it is also planned to make several alterations at the plant in order to increase production.

An extensive construction and expansion program utilizing heretofore untapped sources of wood supply has already been started at the Deferiet branch of the St. Regis Paper Company in order to bring about increased production. The plant has enlarged its force.

At the Union Bag and Paper Company, Hudson Falls, it was stated that the corporation has urgent government contracts which must be completed.

Several hundred workers were affected at the Behr-Manning Company, Watervliet, following suspension of production in the aviation division but some were absorbed in other departments which have civilian orders.

The Port District Commission is preparing to resume civilian shipping operations at the terminal in Albany, N. Y. within the next several months. Swedish wood pulp, formerly imported in large quantities at the terminal here, is now arriving at Boston, Baltimore and other ports. The area now under government reservation includes about a mile of docks, five large warehouses and other buildings. Prior to the war, it is estimated that over 100,000 tons of foreign pulp was brought to this city from the Scandinavian countries for the benefit of paper mills in this section.

Majority Favor Abitibi Plan

TORONTO, Ont., August 27, 1945—Chairman of Abitibi Power and Paper Company common shareholders' committee, R. G. Meech, has written the common shareholders pointing out that the original letter sent them in April, 1939, announcing the formation of a committee "to enable holders of the common shares to protect themselves against the imminent threat of virtual confiscation of the shares" received a response representing more than 60% of the then common shareholders. In all negotiations carried on by this committee, it is pointed out, "one aim only was kept in mind, namely, the securing for the common shareholders of a fair and proper share in the equity of the company."

The committee representing the common shareholders recommends the acceptance of the plan and declares that "it is essential that as many shares as possible be represented at the common shareholders' meeting."

Meetings of the common shareholders as well as of all other classes of securities are to be held from October 4 to 10.

MOST SHORT CENTER DRIVES SLIP TOO MUCH ...NOT THIS F. L. A. T. DRIVE

ESPECIALLY WHEN BELTED BY "RESEARCH"

Belt slip . . . which wastes power and burns belts . . . is caused by insufficient belt tension or insufficient belt grip. Neither of these faults can exist on a Flat Leather Automatic Tension drive equipped with "Research" leather belt.

The pivoted base of the F.L.A.T. drive automatically adjusts belt tension to accommodate varying loads. And the high-friction, pliable "Research" belt hugs the small pulleys with maximum pulley grip.

Careful checking of hundreds of cases where "Research" has been used with the F.L.A.T. drive, has proved more power delivery at rated load than a comparable V-belt drive; and this efficiency is maintained under conditions (above or below rated load and rated tension) where efficiency of other types of belting drops way down.

The life of a "Research" leather belt on F.L.A.T. drive exceeds that of a V-belt on a comparable drive, which is further proof that slippage is much less on this type of drive.

Ask your Graton & Knight distributor for a demonstration.

"Research" Leather Belting is the belt recommended for dependable, trouble-free service on Flat Leather Automatic Tension drive.

An exclusive "weight-controlled" currying, which works back into the leather the proper amount of life-giving, life-preserving natural lubricants, is responsible for the high coefficient of friction and extreme pliability. "Research" hugs the small pulley with minimum slip and takes the continual flexing without excessive wear or waste of power. Its load-carrying capacity actually *improves* with use.

Write for new, free Belting Manual — to Graton & Knight Company, 337 Franklin Street, Worcester 4, Mass.

GRATON AND KNIGHT

Research Leather Belting

from Graton & Knight's line of leather belting—the most complete for all applications. Graton & Knight distributors are listed under "Graton & Knight" in "Belting" section of Classified Telephone Directory and THOMAS' REGISTER.

WASHINGTON LIFTS PAPER CONTROLS

(Continued from page 11)

use as primary containers for shipping and storing many commodities in bulk, including agricultural products, chemicals, pigments, building materials, minerals, certain fuels and other miscellaneous products. During the emergency millions of tons of commodities and products designated for the Army, Navy and War Food Administration were packed in this type of sack.

Revocation of Limitation order L-303 frees insect-screen wire cloth for all civilian use. The order had controlled distribution to make certain that after military requirements were met essential users, such as hospitals, health centers and food processing establishments, would be able to obtain screen materials.

The sharp drop in military requirements when the war ended made the order no longer necessary. It was pointed out by WPB officials that the armed forces had taken four-fifths of second-quarter production of 145,000,000 square feet. Output is expected to be greater in the current quarter, they said, since shortage of labor no longer is a limiting factor.

Asbestos textiles are used for such civilian products as brake linings, theater curtains, mechanical packings and gaskets, safety clothing and fire-fighting equipment. Revocation of Materials Order 283, effective August 31, removes all controls on manufacture and end use of this material.

Also revoked was Material Order M-8-a, which restricted the sale, delivery and use of all cork products.

The revocations were contained in Amendment 2 to Priorities Regulation No. 31.

SUGGEST P.W.A. PROJECT FOR WOLF RIVER

(Continued from page 12)

Before **the war, he said, there were** mills in Shanghai and Canton which had a capacity of up to 20 tons daily, but they were taken over by the Japanese when hostilities broke out in Asia. There are some small mills in China where paper is made by hand in the method of 1,000 years ago.

Cheng said there is a peacetime potential market of about 600,000 tons annually in China, and it is his mission to help his country make more and better paper.

China makes its paper out of bamboo, raw straw reed, cornstalk and wood. Because those are the raw materials, Cheng is primarily interested in the study of sulphate pulping.

Nine employes of Kimberly-Clark Corporation's Lakeview mill, Neenah, Wis., were honored Sunday, August 26, at an Old Timers' party at Telulah park Appleton. The party was arranged under direction of Art Homblette, general chairman. The guests of honor represented 274 man-years spent with the corporation.

Heiser Heads Alkali Branch

Edward Heiser has been made manager of the Cincinnati office of Michigan Alkali Division of Wyandotte Chemicals Corporation. Mr. Heiser joined the New York sales department of the Michigan Alkali company in 1927, was later transferred to Detroit, and for the past two years has been a member of the Chicago sales force. He succeeds G. T. Robinson who has been transferred to Chicago to manage J. B. Ford Division sales in the mid-western area.

Bleached Pulp Reaches Holyoke

HOLYOKE, Mass., August 25, 1945—The first Swedish bleached pulp, for which fine writing paper mills have been starved for five years, reached Holyoke this week.

It was a carload shipment for Whiting and Company, and it wasn't long before the men were getting it ready for the beaters.

Unbleached pulp has been coming into Holyoke for the past month but this is the first batch of bleached pulp to arrive, William L. Brodeur, plant superintendent, said.

Ross Describes Drying Methods

Catalog No. 131, just issued by the J. O. Ross Engineering Corporation, is unusually complete in the helpful information it provides. It not only devotes a large section to the principles and processes of industrial drying and describes methods employed in a variety of industries but treats also such subjects as infra red drying; sources of heat and heat cost, comparisons, material handling, oven construction and temperature control.

Copies of Catalog No. 131 may be had by writing to the J. O. Ross Engineering Corporation at 350 Madison Avenue, New York 17, N. Y.

Heffernan Moves Up with Monsanto

BOSTON, Mass., August 27, 1945—Appointment of H. J. Heffernan as assistant general manager of sales of Monsanto Chemical Company's Merrimac Division here, effective September 1, was announced today by D. S. Dinsmoor, divisional general manager.

Heffernan entered Monsanto's service as a salesman in 1926, and since 1929 has been branch manager of the division's New York office. He succeeds the late Horace Burrough III, who died August 9, and is in turn succeeded by W. E. Drown, now his assistant in the New York office, a chemical engineering graduate of Northeastern University who has been with Monsanto since 1929.

Swenson Advances Lientz

HARVEY, Ill.—James R. Lientz has been named consulting chemical engineer of the Swenson Evaporator Company in charge of all sales to the pulp and paper industry. His headquarters will be in Harvey. Mr. Lientz has been with the Swenson Evaporator Company for eight years during which time he has spent most of his time on the development and sales of equipment for the pulp industry. He is placed in charge of this particular division for the purpose of rendering a more valuable service to the pulp and paper industry as a whole.

Pennsalt Lists Its Products

PHILADELPHIA—Pennsylvania Salt Manufacturing Company, announces that copies of their new pocket-size booklet, "Pennsalt Industrial Chemicals and Specialties" are available for distribution upon request. This descriptive booklet lists the industrial chemicals and specialties manufactured by Penn Salt under the Sales Division controlling them. In addition, data is included on the industries served by Penn Salt and the addresses of their district sales offices and plants.

WATER WINGS FOR A FLYING LIFEBOAT

Sails and all other fabric parts of rescue craft are protected by light-weight coatings of GEON

WHEN one of the newly developed Higgins airborne lifeboats parachutes to the aid of downed fliers, a lot of GEON polyvinyl resin in the form of fabric coatings drops with it. Sails, sail covers, tarpaulins, water catchers—all are made from a GEON-coated fabric ("Duroduck", by Hudgins & Ratsey). Even the parachute packs and instrument cases are coated with this life-lengthening material.

That's because coatings of GEON offer such high resistance to normally destructive factors. For example, in the South Pacific area, an untreated fabric may be attacked by mildew and fall to pieces overnight. But mildew has no harmful effect on a coating of GEON. Nor does GEON suffer from the effects of sunlight, air, heat, cold, salt water, abrasion—all of which are present in this unusual service.

In other fields, GEON may be made into products that resist oils, acids, foods, creasing, and flame. GEON raw materials may become a transparent packaging material that can be heat-sealed—or scuffproof luggage that will wear indefinitely—or shoe soles and heels that will last as long as the uppers—or upholstery material that can be left outdoors because it resists the action of sun and rain. All products of GEON may be delicately or brilliantly colored. There will be uses for products made from GEON in every industry. For more information please write Department MM-9, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio.

Geon
Polyvinyl Materials

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

M. & O. Sets Up Reemployment Plan

MINNEAPOLIS, Minn., August 20, 1945—Minnesota and Ontario Paper Company seniority presently will govern the order in which returning veterans are reinstated in their former positions, Donald D. Davis, Company president, announced today in a statement outlining the Mando policy towards employes returning from military service. When a veteran is reinstated to a position lower than he would have attained had he remained in the Company's employment, a definite decision must be made within not to exceed six months as to whether or not the reinstated veteran has the ability to qualify for the higher position, he declared.

"At intervals, not to exceed 60 days, the Company and the Union shall jointly review the veteran's case to determine whether or not he has acquired sufficient skill to justify his advancement to the higher position," Mr. Davis asserted.

"When a former employe who entered the armed forces directly from our employ returns and refuses or is unable to perform the duties of the position to which he is legally entitled, we will seek to place him in another that is mutually agreeable. If this is done, the veteran will be informed that his status is that of a new employe, subject to any prior rights of other veterans previously holding that position.

"The Company shall not refuse reinstatement of a veteran whose physical or mental condition appears to be such that suitable employment cannot be found for him until a complete medical examination is made at expense of the Company," Mr. Davis said.

Mentally or physically handicapped veterans will be given advantage of a complete medical examination at company expense if such examination is required to determine employe's ability to perform duties of any available position.

Returning veterans will be reinstated to all group life and hospitalization benefits without a waiting period immediately upon return to employment, it was added by Mr. Davis.

Turning to the fields of education and training, he declared it would be the policy of the Company to grant leaves of absence of reasonable length to reinstated veterans for the purpose of permitting them to avail themselves of educational or vocational training allowances which will permit utilization of such training in job opportunities with the company.

Because it is recognized that some reinstated veterans may experience difficulty in adjusting themselves to civilian life, Mr. Davis added, it will be the Company's policy to grant a reinstated veteran once within his first year of reemployment, a leave of absence up to 90 days.

The reemployed veteran will suffer no loss of seniority because of leave of absence, he explained, and seniority will apply during leave to the same extent had the veteran remained in the Company's employ during that time.

The term "reinstated veteran" was defined by Mr. Davis as applying to one who entered the armed services "directly from our employment and who was reinstated into our employment within 90 days of his discharge from service."

He asserted that reinstated veterans who, at the time of entry into the armed forces had more than one year's service and who had a pro rata vacation credit which was not paid at the time of entry into service, will be paid such pro rata vacation allowance at the time of reinstatement, or credited with a comparable vacation with pay.

"Reinstated veterans, consistent with past policy, will be given full vacation credit for time spent in the services," he said. "If actually in our employ on the vacation year anniversary date, they shall be granted vacations with pay just as if they had been in our employ the full preceding year."

WOODPULP SALESMAN WANTED

We have territory for salesman experienced in domestic and imported woodpulp. This is a splendid opportunity for right party to secure permanent, favorable position. Apply (in confidence) to Box 45-515, Paper Trade Journal.

S-13

Powell River Co. Appoints Counselor

VANCOUVER, B. C., August 6, 1945—D. K. Macken, who temporarily took over the post of veterans' personnel counselor for the Powell River Company at Powell River, B. C., is now retiring in favor of Lieut. Jack Gebbie, who has undergone a special course of training to qualify him for this appointment.

Lieut. Gebbie served through the Italian campaign, and has been overseas since 1941. On his return to Canada, the Powell River Company sent him to Ottawa to undertake a three-week course in rehabilitation work in the federal department of veterans' affairs. He then spent two weeks in a tour of eastern industrial plants where similar veterans personnel departments are in operation.

Isaac Joins Dixie Cup

Ralph N. Isaac, who received his Honorable Service Button when discharged at Fort Dix, New Jersey, on May 11 this year, is now selling Dixie Cups in Syracuse, N. Y. Mr. Isaac entered the Army on October 22, 1942, and served in the Personnel Consultant Section as personnel consultant and also as classification and personnel technician. Before the War Mr. Isaac covered New York and western Pennsylvania for American Tissue Mills.

John Coldren, who has been covering Syracuse territory has been assigned to sales supervision in Newark, New Jersey.

NLRB Orders Union Bag Vote

SAVANNAH, Georgia, August 11, 1945—The National Labor Relations Board has ordered an election among employes of the Union Bag & Paper Company, this city, on whether they wish to be represented in collective bargaining by the Savannah Printing Pressmen and Assistants' Union (A.F. of L.). The election must be held within 30 days from August 10.

Pejepscot Grants Wage Increase

The Pejepscot Paper Company with pulp and paper mills at Topsham and Pejepscot Mills, Maine, have granted a 3 cent per hour wage increase.

For *Perfect Control* of Drum Winding

HORTON *Variable Speed* CLUTCH PULLEY

SHOCKLESS STARTING
SMOOTH ACCELERATION
EASY THREADING AND INCHING
VARIABLE SPEED
FRACTIONAL TO 150 H. P.

Controlled Tension from Start to Finish
THE SLIPPAGE IS IN THE VARIABLE SPEED CLUTCH PULLEY
AIR COOLED
CONSTANT SPEED
MOTOR DRIVE

HORTON Manufacturing Co.
3012 UNIVERSITY AVE. S. E., MINNEAPOLIS 14, MINN.

HISTORICAL HIGHLIGHTS OF PAPERMAKING NO. 17

Oops, Mrs. Buttonshaw!

"Steady there, Mrs. Buttonshaw. Take it easy." For poor Mrs. Buttonshaw, wife of an 18th Century English papermaker, accidentally dropped her bag of bluing into a tub of pulp just as she was about to do her linens.

Knowing her husband . . . and the wisdom of silence, it was not until some weeks later that she confessed to her historical slip. For the paper produced from that particular pulp was very white and brought several shillings more in the London market than any Mr. Buttonshaw had ever produced before.

Her happy accident gained Mrs. Buttonshaw a costly scarlet coat. More important, it showed future papermakers how to make a paper of an especial whiteness.

☆ ☆ ☆ ☆

Here, at Cheney Bigelow, we serve the paper industry with our best in Fourdrinier Wires, Dandy Rolls, Cylinders and Pulp and Paper Mill Wire Cloth.

CHENEY BIGELOW

Fourdrinier Wires · · Dandys · · Cylinders · · Wire Cloth

CHENEY BIGELOW WIRE WORKS · 417 LIBERTY STREET · SPRINGFIELD, MASS.

Taber Offers New Shear

The Taber Instrument Corporation, North Tonawanda, N. Y., manufacturers of the Taber V-5 stiffness gauge announce the availability of their new triple cut specimen shear, Catalog No. 104-11. This shear was designed for use with the Taber V-5 stiffness gauge to assure accurate cutting of test specimens (1½ x 2¾") for uniform and comparable test results. Its use is recommended especially for shearing very thin specimen materials which if not cut to precision may effect the test results. The shear will cut .02-inch paper, plastic or thin metallic sheet and foil in preparation of stiffness or resilience test on the Taber V-5 Stiffness Gauge. A test strip is cut and detached from a sheet in one operation by simply placing the straight edge of the sample sheet against the back gauge of the Shear and pushing down with a quick motion.

The company also announces the availability of extra auxiliary weights for the V-5 stiffness gauge in 3000 and 5000 units. These extra units extend the testing range of the instrument to cover twice the capacity of the standard units.

Hubbs & Howe 50 Yrs. Old

BUFFALO, N. Y., August 27, 1945—This year marks the Fiftieth Anniversary of Hubbs & Howe Company of Buffalo. This concern really had its beginning in the early days of C. F. Hubbs Company in New York City, due to the association of William H. Howe, with his brother-in-law, Charles F. Hubbs. These two gentlemen were youngsters around 19 years of age when Mr. Hubbs took over the concern, in New York, founded by his father. The local house was opened in the fall of 1895.

From the records of those early days in Buffalo it is most interesting to note that, of the original suppliers, the company is still buying from seventeen of them. The list of these manufacturers follows:

A. P. W. Paper Company, Albemarle Paper Mfg. Company, Case Brothers, Detroit Sulphite Company, Diamond Mills Paper Company, Gould Paper Company, Robert Gair Company, P. H. Glatfelter Company, Hollingsworth & Whitney Company, Ludlow Manufacturing Company, Moore & Thompson Paper Company, New York & Pennsylvania Company, Paterson Parchment Paper Company, Phoenix Toilet and Paper Manufacturing Company, Riegel Paper Corporation, Stone & Forsyth Company, Victoria Paper Mills Company.

William A. Duggan Dead

William Arthur Duggan, 46, sales manager for the Rhinelander Paper Company, Rhinelander, Wis., died Monday, August 20, at St. Mary's hospital at Wausau, Wis., after a brief illness.

He was born August 13, 1899, and attended parochial and high schools at Stevens Point, Wis. After graduating from high school, he was employed by the Whiting-Plover Paper Company, for which he worked until he enlisted in the Marines in 1918. After his honorable discharge, he entered the employ of the Consolidated Water Power and Paper Company at Stevens Point and later at Wisconsin Rapids, Wis., advancing to the position of sales manager. On November 15, 1939, he became sales manager for the Rhinelander Paper Company.

Surviving are the widow; his mother, Mrs. Mary Duggan, Stevens Point; four children; a sister and a brother. Funeral services were conducted Friday morning, August 24, at St. Stephen's Catholic church, Stevens Points, and burial was in St. Stephen's cemetery.

Mr. Duggan was a member of the Elks lodge, the American Legion and the Rhinelander Rotary Club.

John B. Berryman

John B. Berryman, Chairman of Crane Company Board of Directors since 1935, died in Chicago on Friday, August 10, at the age of 83. Mr. Berryman was born and received his early education in Canada, coming to Minneapolis in 1885 where he started as a bookkeeper in the plumbing supply company that later became Crane Co.'s Minneapolis branch. After a few years as manager of that branch, he was made manager of the company's newly created Engineering Sales Department in Chicago.

In 1911, he became Secretary of the company and the following year, upon the death of R. T. Crane, the founder, he was elected a director and 3rd vice-president. He served as a director from that time until his death. In 1914, he was advanced to 1st vice-president, which position he held until his election to the presidency of the company in 1932. He served in this capacity during the trying years of the depression and, then in 1935 relinquished active management to younger men.

Funeral services were held at St. Andrews Episcopal Church, Downers Grove, Ill., on Tuesday afternoon, August 14, and he was buried near the country home on the edge of that suburb where he had lived for many years.

Item Added to Mexican Import List

WASHINGTON, D. C., August 27, 1945—The following new item covering newsprint was added to the Mexican import tariff by a Presidential decree: white paper, containing more than 80 per cent mechanical wood pulp, weighing more than 50 grams but not exceeding 57 grams a square meter, and yielding up to 6 per cent ash, provided that it is imported in sheets not less than 50 centimeters in width and 70 centimeters in length, dutiable at 0.07 peso per gross kilogram.

This item is subject to the general surtax of 3 per cent of the duty on all importations by freight or express or 10 per cent of the duty on importation by parcel post.

SAVES UP TO 70% IN LABOR

High-speed grinding reduces grinder room crews. With the large daily capacity of the new Roberts Grinder fewer units are needed to produce a required tonnage. Many new features reduce maintenance and operating attention. With a wood conveying system one operator easily feeds two grinders producing up to 100 ton of pulp in 24 hours. Thousands of man-hours are saved annually with the Roberts Grinder. Grinder room crews are cut from 50% to 70%. In one mill 82 men were employed for 31 pocket grinders. When 11 Roberts Grinders replaced the pocket type only 30 men were needed, including supervision and maintenance. With savings like that it is easy to see why the Roberts Grinder lowers the cost per ton to manufacture groundwood pulp. Write for complete information.

ROBERTS *Continuous* GRINDER

THE APPLETON MACHINE COMPANY

APPLETON • WISCONSIN • *Eastern Sales Representatives: CASTLE & OVERTON, Inc., 630 Fifth Avenue, New York*

Celanese Names New Heads

After a meeting of the Board of Directors of Celanese Corporation of America held August 23, 1945, Dr. Camille Dreyfus, who acted as chairman, announced that in addition to other business transacted several promotions had been effected in the personnel of the management. Dr. Dreyfus was elected chairman and as such, will continue to act as the chief executive officer of the company. William McC. Cameron and J. A. Larkin were elected first vice-chairman and second vice-chairman respectively and Harold Blancke was elected president.

In addition, F. T. Small, plant manager at Amcelle, Md., and P. D. Cooper, plant manager at Celco, Va., and Col. Harry Price, yarn sales manager, were elected vice-presidents. G. H. Richards, assistant treasurer, was elected treasurer, and R. O. Gilbert, assistant secretary, was elected secretary.

H. C. Van Brederode and J. P. Holmes were elected vice-presidents of Celanese Company, Inc., a wholly owned subsidiary, at a meeting of the board of directors of that company held the same afternoon. At meetings of the boards of directors of Williamsport Textile Corporation and Staunton Textile Corporation, wholly owned subsidiaries, Thomas B. Congdon was elected a vice-president of both companies.

Bradford Firm Opens Office

BOSTON, Mass., August 27, 1945—The Bradford Paper Company, in which Maurice Bloom and George Myers, both well known in the trade for a good many years, are partners, have opened offices at 212-214 Summer street. They will handle all types of fine printing paper.

Salesmen Stress Placement

Stanley O. Styles, president of the Salesmen's Association of the Paper Industry on August 24 sent the following letter to members:

"All members of the Paper Industry can be duly proud of their splendid record during the war period, a record of fulfilling every requirement of the Government agencies and the essential civilian needs.

"We have all enjoyed the recent days of celebration but now we must face with sober and constructive thought the problems of reconversion. The problems of the Paper Industry are manifold and complex. One of the most important for all manufacturers of paper and board will be the problems of sales representation and distribution. Problems that will require intense study by competent and experienced men who must acquire or form capable and efficient organizations to promote and sell their particular products.

"For a number of years the Salesmen's Association of the Paper Industry has sponsored a personnel service, where salesmen seeking positions can file their applications and manufacturers can list their vacancies in strictest confidence. It has been a service of real value to the Paper Industry because it has been under the direction of a competent committee who carefully investigate the requirements of the particular vacancy, and send men for interview who are capable of meeting the requisities.

We are pleased, at this time, to again call your attention to this service which is available without charge and offered in the interest of the Paper Industry. All communications are confidential and should be directed to the attention of Dr. E. O. Merchant, Secretary-Treasurer, Salesmen's Association of the Paper Industry, 122 East 42nd street, New York."

SINCE 1828 — CONTINUOUSLY WE HAVE SERVED THE PAPER INDUSTRY.

The war is not over. But when it is over, will you be among the first to receive new equipment?

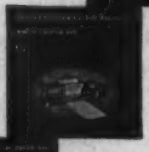
We can now book approved orders which will be filled in the order received.

Some will have to wait—so plan now to be the first.

Paper Bag Machines

Paper Machines **Jordans**

Paper Trimmers—new model E.



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MANUFACTURING COMPANY

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Attractive in appearance and combining the same high accuracy and durability that have made this manufacturer's products famous for nearly a century, a modernized portable beam scale is offered by The Howe Scale Co., of Rutland, Vt., incorporating important advantages that mean greater satisfaction and longer life. It is designated as Model No. 54 and has a capacity of 1,000 pounds.

For quicker more accurate readings, graduations are die-cast on the lower edge of the beam on this scale where they shine out clearly against a dark red background. The possibility of errors in reading is still further minimized by a center-indicating poise with a non-removable set screw. Both beam and poise are die-cast from corrosion-resistant metal. Wheels are so designed that the ends of the axles are enclosed and do not project to tear clothing or bags.

Sustained accuracy over long periods of service is achieved by a special Howe feature, four ball bearings set between the platform and the pivot bearings. These ball bearings absorb the brunt of platform movements which would otherwise be transmitted directly to the keen knife edges of the pivots and dull them, thus impairing the sensitivity of the scale. Other Howe features include heavy cast levers with extra size pivots and bearings made of specially tempered tool steel; interchangeable pivots; and self-aligning load bearings suspended in forged loops which allow complete contact of bearing and pivot knife edges at all times.

The platform is cast in one piece, while an extra-long skirt keeps dust and dirt out of the scale mechanism. Two steel braces hold the pillar sturdily in position. The pillar and cap have an attractive natural wood finish while the platform, skirt and pillar braces are finished in stippled grey.

The No. 54 is available with either a single beam graduated 100 by ½ pound, a double beam similarly graduated, or a full-capacity beam graduated 100 by ½ pounds on the upper bar and 100 to 1,000 pounds on the lower bar. A drop lever, pillar guard, and balance indicator can also be furnished for this model.

Elof Hansson Moves

New offices for Eloff Hansson, Incorporated, have been opened in the Daily News Building at 220 East 42nd street, New York city, where future export activities of the company will be centered.

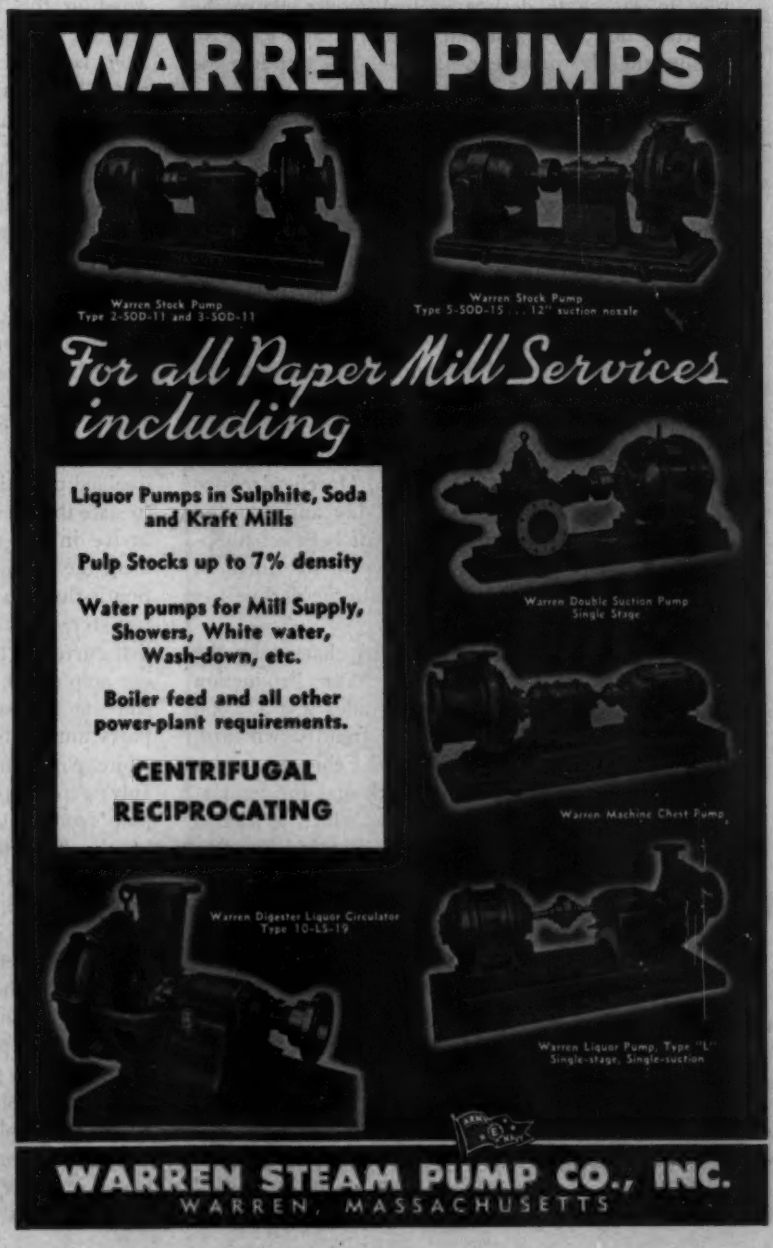
Plans Study Program

An educational program to enable men and women, who may or may not have a college education, to enhance their knowledge of the chemistry and technique of paper making and converting, has just been announced by St. Joseph's College, 54th street and City Line avenue, Philadelphia, Pa.

The program includes three-hour sessions on three evenings weekly for two years. The course consists of mathematics, English and fundamental chemistry. Plant practices include use and maintenance of paper machines, economics of paper making, water chemistry, waste disposal, colloid and cellulose chemistry, the theory and practice of paper making and converting, and the fundamentals of electricity. The first semester begins in September.

Rhinelander Opens Season

RHINELANDER, Wis., August 27, 1945—First meeting of the fall program of divisional meetings of the American Association of Pulp and Paper Mill Superintendents is scheduled for this city, on September 8. On that day the Northwestern Division will hold its business meeting in the morning at the Oneida hotel.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PAPER
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WOOD PULP SUPPLY RISING

All the charted basic trends in the pulp and paper industry continued slightly downward at the end of the half yearly period, excepting pulpwood receipts of which continued upward. At the beginning of the current year all these trends; paper, paperboard, pulpwood, wood pulp, and waste paper, were downward. In May, paper output after the February decline, rose in March to decline in that month above the February low, to rise again in March and to again decline slightly to the end of June. The trend in the output of paperboard was similar.

Pulpwood output at the start of 1945 was declining but improved slightly in February and continued favorable until March, when a series of declines continued to lower receipts until the middle of March, since which date receipts have continued upward. The trend in the new supply of wood pulp declined below the monthly 900,000 tonnage in February, with consumption approximating output. The decline in April approached but did not dip below the above tonnage, to rise in May and the June output indicates a steady improvement, with consumption slightly above production. The trend in waste paper receipts at the mills rose sharply in January, lost the gains in February, rose to a higher tonnage in March, dropped slightly in April, rose slightly in May and dropped rather sharply in June. The trends of both consumption and inventories rose steadily in February to reach peaks in May, from which date the decline has been slight.

The trends in pulp inventories as charted by the Forest Products Bureau of the War Production Board, show that the total of all grades was 333,000 tons on January 1, 1945 with the trend downward, which continued until the middle of February to rise in an arc to 349,000 tons in March and the total at the end of June was 363,000 tons, which is 11.0% under the first half of 1944, the greatest decline being 30.5% in unbleached sulphite. At the close of the first half of this year the inventory trends in most grades of pulp continued upward, the exceptions being in groundwood and in the miscellaneous grades.

Total United States production of wood pulp in June was 889,000 tons, compared with 919,000 tons in May, with 854,000 tons in June 1944 and with 772,000 tons in June, 1943. Total output for the first half of 1945 was 5,219,000 tons, compared with 4,972,000 tons in the like period in 1944, a gain of 5.0%. Domestic consumption of wood pulp for June, 1945 totaled 947,000 tons, compared with 971,000 tons in May, with 930,000 tons in June 1944, and with 899,000 tons in June, 1943. Total consumption for the first half of 1945 aggregated 5,597,000 tons, compared with 5,441,000 tons in the first half of 1944, a gain of 2.9%. Imports of wood pulp in the first half of 1945 totaled 504,000 tons, compared with 545,000 tons in the like period in 1944, a decline of 7.5%. The largest decline in the papermaking grades was in bleached sulphate which dropped 15.2% from 1944. Total exports in the current half year were 114,000 tons, compared with 104,000 tons in 1944. The inventory position in June, 1945, aggregating 363,000 tons, compares with 408,000 tons in 1944, and with 668,000 tons in 1943; for the first half of 1945, the decline from the 408,000 tons in 1944, indicates a decline of 11.0%.

The improving wood pulp supply situation is indicated in the Department of Commerce report for August, which shows that over-all production was 5.0% larger in the first half of this year than in 1944, and all grades showed varying increases except unbleached sulphite which declined 3.1%. The largest increase in the half yearly period of the current year was in miscellaneous grades of pulp up 20.7%; bleached sulphate up 14.6%; bleached sulphite up 6.3%; soda up 4.8%; groundwood up 4.6% and semi-bleached sulphate up 0.5%. Output of high alpha and dissolving grades also increased 21.3%.

In commenting on the wood pulp situation the Department report states that the output in June remained relatively high, 20,000 tons above the monthly average so far for 1945, while consumption was about 14,000 tons above the six months' average for 1945; imports remained about average, while exports doubled over the previous month. The report goes on to state that, it is most urgent that sufficient kraft pulp arrive in the remaining months of 1945 to supplement the possible loss in kraft pulp production in the South through the anticipated loss of war prisoners transferred back to Europe. The report also states that currently there is a substantial cutback in nitrating pulp needs, allowing a diversion of more bleached sulphite for paper. This with the Swedish pulp imports anticipated, should assist in materially easing white paper supplies. Imports of Swedish pulp in July were sulphite. Total overseas imports of wood pulp from V-E Day through July 27 were reported by the Department at 22,753 short tons, of which about one-half consisted of unbleached sulphate. It is unofficially reported that an additional 60,000 to 70,000 tons is expected to arrive in this country this month. No definite information as to the quantities arriving in the United States is available but the aggregate tonnage is now expected to approximate 400,000 tons, providing shipping facilities are favorable. Coal is a prime problem in Sweden now but the recent Swedish-Polish negotiation in which Poland agrees to supply Sweden with 1,000,000 tons of coal and 200,000 tons of coke during the next five months, is considered a favorable sign. The shipping situation at this date is also regarded as favorable. Contrary

to earlier unfavorable reports, it now appears that Norway may be able to export in the next 12 months about 100,000 tons of groundwood and bleached sulphite pulp and approximately 150,000 tons of paper and paperboard. Only small supplies for European countries is expected from Finland during the next few months.

To End Priorities System

The War Production Board has taken action to eliminate at the end of September the old wartime priorities control system, including the Controlled Materials Plan, and to substitute a new, limited system for use during the reconversion period.

Victory over Japan reduced military requirements to such an extent that the all-embracing wartime priorities system no longer was appropriate, and its continuance would interfere with prompt reconversion, WPB said.

The changes were made through amendments to Priorities Regulations 28 and 29 today. The new Priorities Regulation 29 provides:

1. Cancellation, effective at once, of all "AA" preference ratings (which includes all ratings except the special "top priority" AAA, the new military MM rating previously announced, and the new CG rating described below) on purchase orders that call for delivery after September 30, 1945. There is one exception—the AA ratings will still apply to textiles.
2. The revocation of the Controlled Materials Plan, WPB's master plan for controlling wartime production, effective September 30, 1945.
3. Cancellation, effective at once, of all allotments of steel, copper and aluminum (the three "controlled materials") for the fourth and subsequent quarters.
4. Introduction of a new junior, non-extensible, civilian "CC" preference rating to be used in limited cases to break bottlenecks in reconversion and insure, when necessary, continued production and services.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1945		Corresponding Weeks—1944	
July 14	88.5	July 15	87.7
July 21	89.8	July 22	91.2
July 28	93.4	July 29	91.3
August 4	93.6	August 5	89.8
August 11 (Revised)	93.0	August 12	91.2
August 18	*67.8*	August 19	90.4

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	88.7	88.5	88.1	87.6	88.7	89.8	80.3	90.6	88.2	92.5	90.6	92.4	88.1
1945	86.7	89.4	90.2	88.1	89.8	91.2	*80.8*						

COMPARATIVE YEARLY SUMMARIES

	1938	1939	1940	1941	1942	1943	1944	1945
Year to Date	68.5	78.7	86.9	94.2	93.8	88.1	87.7	*87.7*
Year Average	71.5	83.4	85.6	97.4	90.4	87.8	88.1	

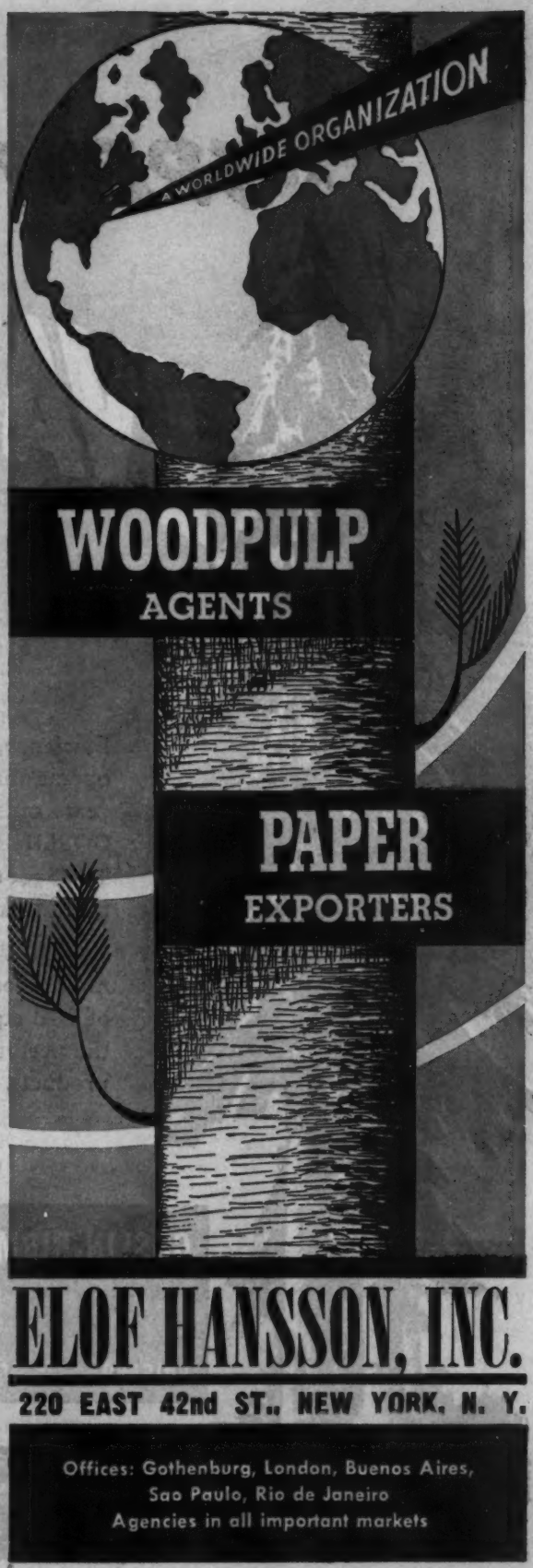
* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Current Weeks—1945		Corresponding Weeks—1944	
July 14	90	July 15	91
July 21	96	July 22	94
July 28	95	July 29	96
August 4	94	August 5	96
August 11	94	August 12	96
August 18	*67*	August 19	95

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	90	96	95	96	96	96	85	96	92	95	95	85	93
1945	91	95	97	97	96	96	*86*						

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.



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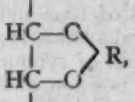
122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

Oxidants that Promote the Dialdehyde Cleavage of Glycols, Starch, and Cellulose*

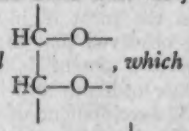
By L. J. Heidt[1], Edward K. Gladding[2] and C. B. Purves[3]

Abstract

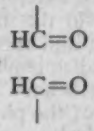
A review of the literature suggests that periodate and lead tetraacetate both condense with 1,2 glycols



to form unstable cyclic esters *R, where R contains heptavalent iodine or tetravalent lead as its central atom. The valence of the central atom is immediately reduced by two units with the formation*



of the divalent free radical *, which promptly rearranges to two carbonyl groups*



The present authors assume that any other oxidant producing the above dialdehyde cleavage in glycols, starch or cellulose must resemble periodate and tetravalent lead in possessing the following four physical properties.

1. The central atom of the oxidant must have a diameter, about 2.5 to 3.0 × 10^{-8} cm., which is large enough to bridge the space between the hydroxyl groups in a 1,2 glycol.

2. The central atom of the oxidant must be able to coordinate at least two hydroxyl groups in addition to groups already attached to it.

3. The valence of the central atom must exceed by two units, rather than by one or three, the valence of the next lowest stable state.

4. The oxidant should have a standard E_o oxidation potential in the neighborhood of about —1.7 volts with respect to the next lowest stable valence state.

A consideration of various physical data, including atomic radii, atomic radius ratios, and standard oxidation potentials, indicated that sodium perbismuthate, $NaBiO_3$, and the hydrated, unstable, trivalent silver ion, Ag^{+++}, possessed all four of the above properties. Trial showed that both of these oxidants cleaved ethylene glycol in high yield to formaldehyde. The highly insoluble perbismuthate may be of value in oxidizing water-soluble glycols. The trivalent silver ion is readily available in an aqueous solution of potassum persulphate containing catalytic amounts of silver sulphate. Other common oxidants, including nitric acid, hypochlorite, dichromate, and permanganate, lack one or more of the four properties mentioned and are not known to oxidize glycol, starch, or cellulose in the dialdehyde manner.

Experiment showed that periodate, perbismuthate, tetravalent lead and trivalent silver all had effective oxidation potentials of —1.15 to —1.25 volts in the pH range 2 to 4.5, at 25°, and at concentrations of practical interest. Since periodate is known to oxidize starch and glycol, although slowly, at an effective potential of —0.8 volts, a somewhat smaller figure applies to the potential at which the rate of oxidation just fails to be perceptible. This "critical oxidation potential" was found to be —0.9 volts for dichromate acting on starch. It seems probable that the "critical potential" of chlorite toward cellulose is more than —0.85 volts and that of hypochlorite less than —0.85 volts. If confirmed, the observation would throw light upon the ability of the former to bleach without degrading. The tentative conclusion was that the magnitude of the "critical oxidation potential" of a given substrate varied with the nature of the oxidant.

The results suggest that the organic chemistry of the oxycelluloses would benefit greatly if it were intimately correlated with inorganic and physical studies along the lines discussed in this article.

The quantitative oxidative cleavage of the —CHOH—CHOH—, or glycol group, to two aldehyde groups by periodic acid has been known since 1928, when Malaprade *(1)* studied the action of this substance upon simple sugar alcohols. Later articles by various authors described the extension of the reaction to sodium and potassium periodates, to reducing sugars *(2)* and to cellulose and starch *(3, 4)*, which were likewise found to be oxidized almost quantitatively in the expected way *(5, 6, 7)*. Malaprade also mixed ethylene glycol with aqueous potassium paraperiodate, $K_2H_3IO_6$, containing phenolphthalein and noticed that the alkalinity of the mix-

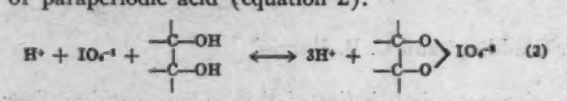
* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 19-22, 1945.

[1] Assistant Professor of Chemistry, Massachusetts Institute of Technology, Cambridge, Mass.
[2] Research Associate, Massachusetts Institute of Technology, Cambridge, Mass., 1941-42. Present address, Jackson Laboratory, E. I. du Pont de Nemours Co., Wilmington, Del.
[3] Member TAPPI; Associate Professor of Organic Chemistry, Massachusetts Institute of Technology, Cambridge, Mass. Now E. B. Eddy Professor of Industrial and Cellulose Chemistry, McGill University, Montreal, Canada.

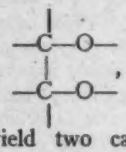
ture suddenly decreased in a manner reminiscent of the well-known decrease caused by the formation of acidic complexes between boric acid and cis-glycols *(8)*. The analogy was elaborated, independently, by Criegee and his collaborators *(9)*, who argued from the tendency of the periodate ion to coordinate, or add, one or more water molecules:

$$H^+ + IO_4^{-1} + 2H_2O \longleftrightarrow 5H^+ + IO_6^{-5} \qquad (1)$$

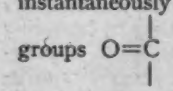
Equation 1 shows that the pH of the medium was a factor in determining the position of the equilibrium and the extent to which the components were ionized. The crystalline paraperiodates, $K_2H_3IO_6$ and Ag_5IO_6, e.g., corresponded to the replacement of two and five of the five hydrogen atoms theoretically ionizable in paraperiodic acid. Criegee assumed that a molecule of a glycol replaced the two water molecules shown in equation 1 and thereby formed an acidic cyclic ester of paraperiodic acid (equation 2).



The cyclic ester (2) was assumed to decompose very rapidly into equimolecular amounts of water, iodic acid, and the free radical,

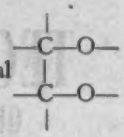


, which instantaneously rearranged to yield two carbonyl groups



(10). Price and his collaborators *(11, 12)* supported Criegee's views by finding that the course of the oxidation was second order with respect to glycol and periodate, that the oxidation proceeded more rapidly in acid than in alkaline solution, and more rapidly with cis than with trans glycols. The general subject of periodate oxidations was recently reviewed by Jackson *(13)*.

In 1931 Criegee demonstrated that lead tetraacetate, $Pb(OAc)_4$, in glacial acetic acid solution also oxidized glycols to pairs of carbonyl groups at rates that were greater for cis than for trans isomers and were dependent upon the particular glycols examined *(14)*. His application of the reaction to simple sugars *(15)* has been developed by Hockett and his collaborators into a versatile and powerful means of determining the structures of sugar derivatives *(16)* and of certain partly substituted esters and ethers of cellulose *(17, 18, 19)*. Criegee's detailed studies of the oxidation mechanism *(9, 20)* led him to assume that one of the alcoholic groups of the glycol first displaced an acetyl group from the lead tetraacetate to form the ester alcoholic (formula 3). This assumption was supported by the isolation of analogous adducts in a crystalline state from thallous acetate, propionate and butyrate, and the corresponding thallic, cobalt and manganic salts, dissolved in moist alcohols. Cyclization of the plumbic ester-alcoholate was attended by the expulsion of the elements of acetic acid and produced the plumbic derivative (formula 4), which immediately decomposed to plumbous acetate, $Pb(OAc)_2$,

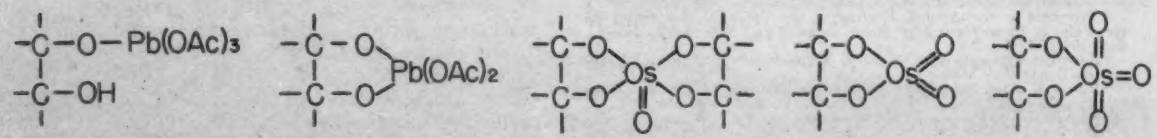


and the free radical . Rearrangement of the latter then occurred as already described for the cleavage with periodate. Although (structure 4) was too unstable to be isolated, its existence was made probable by the isolation in crystalline form of the stable osmium analogues (structures 5 and 6) from aqueous potassium osmate and glycols *(20, 21)*.

The above resumé is sufficient to show that both periodate and lead tetraacetate oxidize glycols in an apparently identical, highly selective way that is at present considered to be peculiar to these two types of oxidant. This fact, together with the great similarity between the reaction kinetics of the oxidations, strongly suggests that the underlying mechanisms must depend upon certain common physical features that are inherent in periodate and tetravalent lead compounds but are absent, in whole or in part, from most other oxidants. Both heptavalent iodine and tetravalent lead compounds often have coordination numbers of four and six and exhibit tetrahedral and octahedral symmetry, respectively, in these two states. Both types of symmetry apparently occur in solution and the position of the equilibrium between them is determined by such factors as pH and the other ionic or molecular species present. The next lower, stable valence states, pentavalent iodine and divalent lead, are both two valence units, rather than one or three, less than the most highly oxidized states. Finally, we have observed that the effective, chemical oxidation-reduction potentials of the periodate and lead tetraacetate oxidants are both in the vicinity of -1.2 volts. A development of these lines of thought has resulted in the discovery that sodium perbismuthate, $NaBiO_3$, and the unstable trivalent silver ion, Ag^{+3}, both oxidize ethylene glycol in high yield to formaldehyde, or behave like periodate. The resulting clarification of the physical characteristics peculiar to oxidants of the periodate type naturally suggests why other oxidants produce different and diverse chemical effects.

Suggested Physical Mechanism for Periodate and Lead Tetraacetate Oxidations

Modern atomic theory *(22)* postulates that an atom consists of a minute, heavy, central core with an integral number of positive electrical charges. This core retains an equivalent number of negative electrical charges, or electrons, in the space about it and the electrons that are farthest away, and are therefore held with least energy, dominate the chemical properties of the atom as a whole. There is a marked tendency for an atom either to lose or to acquire electrons until the number in the outermost shell becomes adjusted to eight. In most compounds this tendency is satisfied by the sharing of two electrons by different atoms; one pair of shared electrons constituting one covalent bond. The distances between the relatively



(3) (4) (5) (6) (7)

heavy, central cores of atoms can often be accurately measured by x ray or electron diffraction methods. This distance for a single carbon-carbon bond is usually very close to 1.54 Angstrom units (1.54 × 10^{-8} cm.) and half this value, or 0.77A, is accepted as the effective radius of the carbon atom in simple organic compounds. X ray measurements also confirm the fact that covalencies are definitely oriented in the space around the atomic core; the four valencies of carbon, e.g., being directed from the center to the four corners of a regular tetrahedron. The effective radius of oxygen is about 0.66A, that of hydrogen in hydrocarbons is about 0.33A, and that of hydroxylic hydrogen is negligible. Figures 1A and 1C give scale drawings of the cis and trans forms of the —C—CHOH—CHOH—C— or glycol group, the four carbon atoms being shaded and the two minute hydroxyl hydrogens being omitted. The absence of the hydroxyl hydrogens imposes the single electronic charge shown on the hydroxyl oxygens, whose other charge, corresponding to their univalent attachment to the carbon atoms, is not shown. These drawings suggest that the space between the two hydroxyl groups is about 3A for cis glycols when the groups are coplanar and increases up to a maximum of about 5.5A when the lower half of the glycol unit is rotated about the central carbon-carbon bond into the trans position. Since thermal energy will always produce some oscillation about the median cis and trans configurations, the effective distances may be somewhat more and somewhat less, respectively, than those indicated. An x ray study of ammonium trihydrogen paraperiodate, $(NH_4)_2\,H_3IO_6$, shows that the six oxygens in the pentavalent IO_6^{-5} ion are at the corners of a nearly regular octahedron containing the iodine at its center. An iodine-oxygen distance of 1.93A corresponds to a nearly covalent bond and to radii of about 1.3A and 0.63Å, respectively, for the iodine and oxygen atoms *(23)*. Although the present authors have not found measurements of the IO_4^{-1} ion, the atomic radii are probably substantially the same, the iodine and oxygen atoms being nearly coplanar or the iodine being at the center of a tetrahedron whose corners are occupied by the four oxygen atoms. It

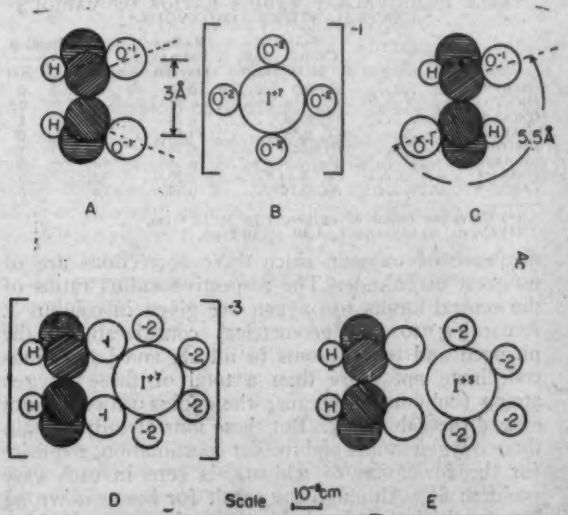


FIG. 1

Scale Drawings of Various Atomic Groupings. A—Cis-Glycol, Minimum O-O Distance about 3 A; B—Tetrahedral, Univalent Periodate Ion about 4.8 A in Overall Diameter; C—Trans-Glycol, Maximum O-O Distance about 5.5 A; D—Octahedral, Trivalent Periodate-Glycol Complex Ion; E—Rearrangement of Electronic Charges in Complex Ion D.

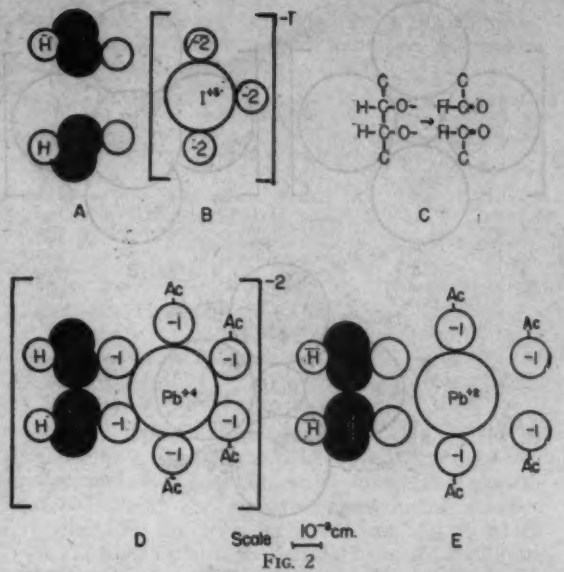


FIG. 2

Scale Drawings of Other Atomic Groupings. A—Two Aldehyde Groups; B—Pyrimidal, Monovalent Iodate Ion; C—Rearrangement of Divalent Free Radical (Fig. 1E to Fig. 2A); D—Octahedral Divalent Lead Tetraacetate-Glycol Complex Ion with Acetyl Residues not Drawn to Scale; E—Rearrangement of Electronic Charges in Complex Ion D.

is known that the atoms in the IO_3^{-1} ion of crystalline iodic acid lie at the four corners of a pyramid *(24)*. Consideration of the scale drawings in Figs. 1A, 1B and 1C shows that the central iodine atom, with its diameter of approximately 2.6A, in periodates or paraperiodates, is quite large enough to come into close proximity with both alcoholic groups of a cis glycol simultaneously but that such approach is less probable when the glycol is trans. The much slower rate at which trans configurations are oxidized is therefore not surprising. Since proximity is followed by coordination of the alcoholic oxygens to the iodine atom, the latter must possess residual valencies suitably directed in space. The fact that residual valencies have definite directions has been amply demonstrated by Werner *(25)* for many complex inorganic salts. In the present case, the four periodate plus the two glycol oxygen atoms almost certainly form an octahedron about the iodine atom, or produce essentially a structure (Fig. 1D) resembling that of the paraperiodate ion in arrangement and in dimensions.

The decomposition of the glycol-periodate complex is obviously concerned with the ability of the iodine to annex an electron from each of the two glycol oxygen atoms. This ability must be a function of the oxidation potential of the iodine atom and the reducing potential of the glycol group. The annexation reduces the valence of the iodine from seven to five; the octahedral structure collapses, one oxygen atom combines with hydrogen ions to form water and the two glycol oxygens separate from the iodine, each minus one of the original electrons, to form the glycol free radical (Fig. 1E). Both of these oxygen atoms promptly make good their deficiency by sharing additional electrons derived from the adjacent carbon atoms, the additional oxygen-carbon covalent bonds form two carbonyl groups and the carbons in turn are compensated by the dissolution of the covalent bond between them (Figs. 2A, 2B, 2C).

The radius of the lead atom in lead tetraacetate does not seem to have been measured directly but is probably not greatly different from the values of 1.46

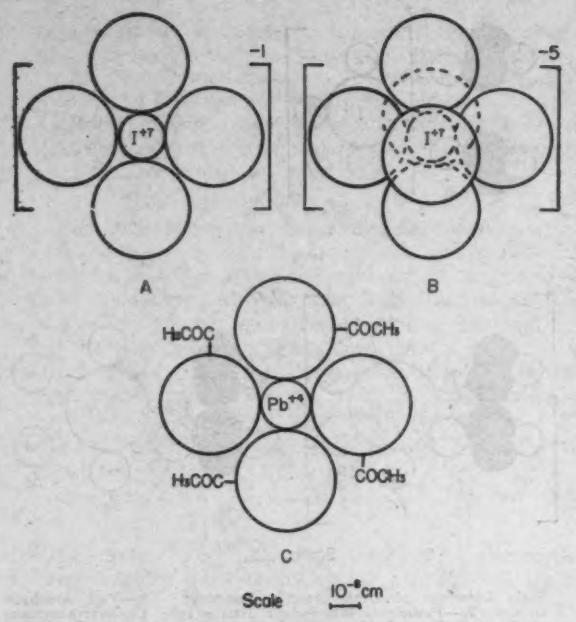


FIG. 3

Scale Drawings of Various Atomic Groupings, Assuming Univalent Radii for Atoms and Ionic Bonding. A—Tetrahedral, Univalent Periodate Ion; B—Octahedral, Pentavalent Paraperiodate Ion, IO_6^{-5}; C—Tetrahedral, Neutral Lead Tetraacetate Molecule with Acetyl Residues not Drawn to Scale.

to 1.50A recently derived from x ray studies of crystalline lead oxides *(26, 27)*. The probable diameter of lead in the tetraacetate, 2.9 to 3.0A, is only slightly larger than that of iodine in periodate. Since the chemical behavior of the two oxidants toward glycol is so similar, a glycol-lead tetraacetate complex ion of the type drawn to scale in Fig. 2D can be assumed, together with the possession of suitably directed residual valencies by the lead atom. The analogous breakdown of this complex (Fig. 2E) agrees with the observation that tetravalent lead has about the same oxidation potential as heptavalent iodine. Boric acid, $B(OH)_3$, is interesting because this coplanar molecule, with a central boron atom 1.7A in diameter *(28)*, gives cyclic complexes with cis but not with trans glycols *(8)*. A rather small size may be the limiting factor in this case. The much larger osmium atom, diameter 2.66 A, *(29)* in potassium osmate coordinates with glycols readily *(20)*.

Application of the Radius Ratio Device

When an attempt was made to find other oxidants that closely resemble heptavalent iodine and tetravalent lead in their atomic characteristics, it was found that the necessary physical data were usually not available. Valuable information, however, can often be obtained by assuming that the two electrons forming a bond are not shared by both atoms but are entirely appropriated by one atom or the other. If the electron pair in the I : O covalent bond is imagined to be entirely annexed by the oxygen atom, the latter experiences a net gain, and the iodine a net loss, of one electron, and the bond is of the ionic type, I^+O^-. It now becomes possible to consider these atoms as electrically charged spheres attracted to each other by electrostatic forces that have no definite direction in space. The maximum valence, or coordination number, of the spherical iodine atom is then assumed to be given by the maximum number of spherical oxygen atoms that can touch its surface simultaneously. This is a geometrical, not a chemical, problem whose solution depends upon the ratio of the radius of the central atom or sphere, r, to that of the surrounding atoms, r_1. If the radius ratio r/r_1 does not exceed 0.15, 0.22, 0.41 and 0.73, then the number of the contiguous spheres cannot exceed 2, 3, 4, and 6, respectively *(30)*. It will be noted (Figs. 3A and 3C) that four contiguous spheres place the central sphere at the center of a regular tetrahedron and six (Fig. 3B) form a regular octahedron. Valence directions are therefore determined purely by geometrical considerations but happen to coincide with what is known about the shapes of the periodate and paraperiodate ions. The radii that have to be used in assessing coordination are, of course, univalent radii, or those calculated from the assumption that the atoms each have one electrical charge. Although this assumption does not greatly change the over-all length of the iodine-oxygen or lead-oxygen bond, the imagined positive charge on the iodine or lead causes the atmosphere of electrons to contract upon the central, positive core and thereby diminishes the effective radius of the atom. The negative charge on the oxygen enlarges the radius for the opposite reason. A comparison of the scale drawings in Fig 3 with those in Figs. 1 and 2 illustrates how greatly the above procedure has distorted the relative sizes of the iodine, lead and oxygen atoms and conveys a warning that the method is not always reliable. Nevertheless, the radius ratio device has usually given reasonable explanations for the observed arrangement of atomic and molecular groupings in inorganic crystals *(31)*. Its use in the present instance can be justified by the results.

Table I, column 2, contains some "univalent" ionic radii for the central atoms of the complex ions listed in column 1. The radii were calculated by Pauling and are summarized in table 123 of Stillwell's book *(29)*. Ionic crystal radii, based upon measurements of crystalline, ionic substances, have been included when univalent radii are not available and are drawn from Stillwell's tables 94, 96, and 122. No corrections have been made in Table I for variation of radii caused by the degree of coordination or for the

TABLE I.—UNIVALENT RADIUS RATIOS OF VARIOUS CENTRAL ATOMS TO OXYGEN [a]

Grouping	Radius of Central Atom × 10^8 cm.	Radius Ratio to Oxygen	Coordination	
			Total	Net
$(NO_3)^{-1}$	N, 0.3	0.17	3	0
$(BO_3)^{-3}$	B, 0.38	0.22	3?	0?
$(ClO_3)^{-1}$	Cl, 0.39 [b]	0.28	4	1
$(ClO_4)^{-1}$	Cl, 0.55	0.31	4	0
$(BrO_3)^{-1}$	Br, 0.53 [b]	0.38	4	1
$(MnO_4)^{-2}$	Mn, 0.50? [b]	0.36	4	0
$(SeO_4)^{-2}$	Se, 0.42 [b]	0.30	4	0
$(AsO_4)^{-3}$	As, 0.70	0.40	4	0

(a) Univalent radius of oxygen, 1.76 × 10^{-8} cm.
(b) Crystal radii, oxygen, 1.40 × 10^{-8} cm.

divalence of oxygen, since these corrections are of no great magnitude. The respective radius ratios of the central atoms to oxygen are given in column 3. According to the geometrical considerations, the nitrogen and boron atoms in nitrate and borate ions coordinate not more than a total of three oxygen atoms (column 4) because the radius ratios do not exceed the value 0.22. But these ions already contain three oxygen atoms and the net coordination, requisite for the formation of adducts, is zero in each case (column 5). Although the result for boron is wrong because the borate ion is known to form coordination compounds readily, the importance of the discrepancy is diminished by the fact that the radius ratio and bond length in compounds of boron are frequently anomalous *(28)*. All the other ions in Table I, with

radius ratios lying between 0.22 and 0.41, can accommodate not more than four oxygens around the central atom. Inspection of their formulas shows that only chlorate and bromate are theoretically able to coordinate even a single extra atom of the size of oxygen. Since the mechanism postulated for the dialdehyde cleavage of glycol requires the simultaneous coordination of two extra oxygens, it is unlikely that any of the ions listed in Table I will oxidize glycols in this particular way. Some, of course, do not oxidize glycols at all.

All of the oxidants in Table II have radius ratios of 0.41 or more and the central atoms are therefore large enough to coordinate a total of six oxygen atoms. In every case at least two additional oxygens can be accommodated before the total of six is reached (column 3), and this condition for the dialdehyde cleavage is uniformly satisfied. The great tendency of most of the ions in Table II to coordinate is well illustrated by the large number of complex, inorganic salts derived from them. Column 4 gives Latimer's values *(32)* for the standard oxidation potentials, E_o, in volts, of the oxidants with respect to the next lowest

TABLE II.—PHYSICAL CHARACTERISTICS OF VARIOUS OXIDANTS

Oxidants	Radius Ratio [a]	Extra Coordination [c]	Oxidation Potential [d] E_o (volts)	Valence States
Group 1				
$(IO_4)^{-1}$	0.44	2	—1.7(?)	7, 5, 1, —1
$(PbO_4)^{-4}$	0.47	2	—1.7	4, 2
$(BiO_3)^{-1}$	0.53 [b]	3	—1.6	5, 3, 2, —1, —3
Ag^{+3}	<0.56	<6	—2.0	3, 2(?), 1
Group 2				
$(MnO_4)^{-1}$	0.41	2	—1.7	7, 6, 4, 3, 2
NiO_2	0.56 [b]	4	—1.8	4, 3(?), 2, 1
CoO_3(?)	0.52 [b]	4	—1.9(?)	4, 3, 2
$(Cr_2O_7)^{-2}$	0.42	2	—1.4	6, 3, 2
MnO_2	0.39	2	—1.3	(7), (6), 4, 3, 2
Group 3				
$(IO_3)^{-1}$	0.67 [b]	3	—1.1	(7), 5, 1, —1
$V(OH)_4^{+1}$	0.49	3	—1.0	5, 4, 3, 2
$(O_2O_4)^{-2}$	0.47 [b]	2	—0.7(?) [e]	(8), 6, 4, 3, 2
$(WO_4)^{-2}$	0.48 [b]	2	—0.6(?)	6, 5(?), 4

(a) Univalent ratio. Oxygen radius 1.76×10^{-8} cm.
(b) Crystal radii. Oxygen radius 1.40×10^{-8} cm.
(c) Radius ratio cooordination of 6 (4 for MnO_3) minus number of oxygen atoms already in the ion.
(d) Of central atom, with respect to the next lowest valence state known to be stable.
(e) Polarographic measurement against normal calomel electrode —0.44 volt. Ref. 39.

stable valence states of their central atoms. These states are noted *(32)* in column 5, which also records valences that are doubtful or are higher (bracketed) than those corresponding to the oxidants considered.

Discussion of Oxidants in Table II

It is obvious that the perbismuthate ion resembles those of periodate and tetravalent lead, not only in ability to coordinate at least two additional oxygen atoms or alcoholic groups, but also in oxidation potential and the one-step decrease of two units to the next lower valence state. Table III shows, indeed, that sodium perbismuthate, $NaBiO_3$, produces the dialdehyde cleavage in soluble starch and rapidly oxidizes ethylene glycol to 2 moles of formaldehyde in a quantitative fashion. Ethanol and formaldehyde are by no means stable in presence of perbismuthate in excess but this disadvantage may possibly be minimized by discovering better experimental conditions. Sodium perbismuthate is available commercially as a highly insoluble brown powder whose reduced form, hydrated bismuthic oxide, $Bi(OH)_3$, is also highly insoluble. Although these properties render perbismuthate of little value for the dialdehyde cleavage of cellulose and other insoluble substances, the isolation of the products from the oxidation of soluble glycols is very easy. It is only necessary to shake a glycol solution with acid perbismuthate for a few minutes, and then to filter the suspension to recover a bismuth-free solution of formaldehyde.

TABLE III.—DIALDEHYDE CLEAVAGE WITH SODIUM PERBISMUTHATE

The perbismuthate, 0.00432 mole, was shaken at 25° with the glycol dissolved in 50 cc. of the buffer solution.

Substance	Moles	Buffer	Minutes	Aldehyde % of Theory
Soluble starch	0.00216	0.1*M* H_2SO_4	....	9-13 [a]
Ethylene glycol	0.085	*M* H_2SO_4	5	98.5 [b]
		2*M* Acetic acid	10	100 [b]
		M Acetate, pH 4.7	30	100 [b]
Ethanol	0.125	*M* H_2SO_4	30	16.4 [c]
		M H_2SO_4	900	38 [c]
		2*M* Acetic acid	1440	16 [c]
Formaldehyde	0.005	*M* H_2SO_4	30	37 [d]
		2*M* Acetic acid	30	14 [d]

(a) Dialdehyde starch, based on starch used.
(b) Formaldehyde, based on oxidant used.
(c) Acetaldehyde, based on oxidant used.
(d) Formaldehyde recovered unchanged.

Another oxidant that produces a high yield of formaldehyde from glycol is silver sulphate dissolved in aqueous sodium, potassium or ammonium persulphate (Table IV). The active agent in this solution is presumably the trivalent silver ion, Ag^{+3}, which Yost *(33)* has isolated in a crude, hydrated condition, and analogy with the other oxidants in Table II, group 1, suggests that the ion occurs in a negative state capable of coordination with hydroxyl groups. It also appears necessary to assume the nonexistence of the divalent ion, Ag^{++}, to preserve the one-step decrease of two valence units (to Ag^{+}) postulated for the dialdehyde cleavage. These suppositions do not appear unreasonable in view of the work of Noyes and his collaborators *(34)*, who showed that the argentic ion, Ag^{+3}, probably exists in coordination with a water molecule as $(AgO)^{+}$ and also in equilibrium with Ag^{+} and possibly Ag^{++}. Moreover, during electrolysis in 6 *N* nitric acid the argentic ion was found to be negatively charged, in agreement with the idea of the present authors that negative, complex ions of the type $(AgO_3)^{-1}$ or $(AgO_3)^{-3}$ are the active agents in the oxidation. The ability of the silver sulphate-sodium persulphate system to promote the dialdehyde cleavage well merits further study.

TABLE IV.—DIALDEHYDE CLEAVAGE WITH OTHER OXIDANTS

The oxidant was shaken for the stated time at 25° with excess of ethylene glycol dissolved in the buffer.

Oxidant	Buffer	Minutes	HCHO [c] %	CH_2OH-CHO [d] %
$Na_2S_2O_8$ + Ag_2SO_4	*M* H_2SO_4	45	69.5	5
	2*M* Acetic acid	60	79	12
	M Acetate, pH 4.7	60	39	47
Pb_3O_4 [a]	1.16*M* Acetic acid	..	95	0
MnO_2 [a]	*M* H_2SO_4	..	53	8
NiO_2 [b]	*M* H_2SO_4	..	0	36

(a) Colloidal surface condition of great importance.
(b) Very unstable. Liberates oxygen rapidly.
(c) Based on oxidant used.
(d) Based on oxidant used. Calculated as glycollic aldehyde and estimated as glyoxal-*bis*-2, 4-dinitrophenylhydrazone.

Since water hydrolyzes lead tetraacetate to colloidal lead dioxide, and the tetraacetate oxidizes aqueous glycols in the normal fashion *(35, 36)*, it is reasonable to infer that the dioxide is the active agent in these circumstances. This was the case, for a 95% yield of formaldehyde was obtained from an aqueous acetic acid solution of glycol shaken with red lead, Pb_3O_4 (Table IV), which behaves like a solid solution of PbO_2 in PbO. The failure of Criegee and his collaborators *(37, 38)* to produce a positive result with lead dioxide and red lead may possibly have been connected with a disadvantageous physical condition in the particular samples used.

Turning now to the oxidants of group 2, Table II, preliminary experiments with permanganate and di-

chromate failed to bring about a periodate-type oxidation of starch *(5)*. Nickelic oxide gave no trace of formaldehyde with ethylene glycol (Table IV) and cobaltic oxide was too unstable to be studied. Although manganese dioxide produced a 53% yield of formaldehyde, yields up to 50% might arise from the decomposition of an intermediate such as glyoxylic acid, CHO—COOH, instead of by the rearrangement of the free radical —OCH_2—CH_2—O—. The yield with manganese dioxide is therefore not large enough to prove that this oxidant resembled periodate in its action. In a word, no evidence was obtained that any oxidant in Table II, group 2 produced the dialdehyde cleavage. Since none of these oxidants undergo the requisite single-step decrease of two units to the next lower valence state, the results lend negative support to the presumed indispensability of this requirement, particularly since there is no marked difference between the standard oxidation potentials in groups 1 and 2.

Although potassium osmate (Table II, group 3) satisfies the two-valence decrease and forms a cyclic complex with glycols, the complex fails to decompose spontaneously and dialdehyde cleavage does not occur. Criegee found, however, that when the complexes (formed from unsaturates and osmium tetroxide) were suspended in ether containing hydrogen peroxide, the expected aldehydes were produced in 60 to 80% yield. Since the potential of the change from hexavalent to tetravalent osmium seems to be considerably less than —1 volt *(39)*, the hydrogen peroxide ($E_o = -1.77$ volts) probably supplied the increased potential required for the decomposition of the complex (structure 6). Criegee suggests that the peroxide oxidizes (structure 6) to the cyclic ester (structure 7) of octavalent osmium and that this ester decomposes spontaneously in the usual way. The stability of (structure 6) therefore seems to depend upon the relatively low oxidation potential of the hexavalent-tetravalent osmium couple. The potentials of the other oxidants in Table II, group 3 are also low, and none are known to oxidize cellulose at a significant rate or in any fashion under ordinary conditions. Many other oxidizing systems, such as arsenate, cupric, silver, and ferric salts, could be quoted from Latimer's Tables *(32)* to show that agents with a negative E_o value of unity or less fail to oxidize cellulose in dilute aqueous solution at room temperature. Nitric acid, with potentials of −0.8 to −1.1 volts, corresponding to different stages of reduction, may be an exception to this generalization. The potentials of other common systems known to oxidize cellulose rapidly, e.g., acid dichromate, ozone, hydrogen peroxide, permanganate, hypochlorite, oxygen and alkali, all lie above $E_o = -1.2$volts. A study of the available information leads to the inference that the dialdehyde cleavage requires an oxidant with an E_o potential of at least —1.0 or —1.3 volts, the latter figure being by analogy with the tetravalent lead and the periodate systems.

The above considerations classify the highest valence states of silver, iodine, lead, bismuth, and osmium together with regard to their action on glycols but reject permanganate. Thiesse's *(40)* studies of oxidation potentials led him to group the compounds ozone, Ag_2O_2, and permanganate with periodate, and pervanadate, perchromate, sodium peroxide, and perborate with hydrogen peroxide. He believed that persulphate resembles hydrogen peroxide in the pH range 1 to 5 but otherwise has a similarity to ozone. Further research is needed to reconcile the differences between Thiesse's and the present classification of oxidants.

Effective Oxidation Potentials

According to Latimer, the standard E_o potential refers to systems at 25° C, (298° absolute) in which all gases are at unit fugacity (about 1 atm. pressure) and all dissolved substances are at unit activity (about 1 molar concentration). Theory requires that if, for example, the redox reaction has a potential E_o

$$A = B + mH^+ + ne$$

against the standard platinum-hydrogen electrode, the potential, E, effective under other conditions is

$$E = E_o - \frac{RT}{nF} \ln \frac{[B]\ [H^+]^m}{[A]} \qquad (8)$$

E_o is by convention a negative quantity for oxidants more powerful than hydrogen ion; R is the gas constant, T the absolute temperature and nF represents the Faradays of electricity involved when the reaction is carried out electrochemically. Since relationships such as (8) assume that the reaction is completely reversible and is accurately and completely described by the equation as written, they cannot be used indiscriminately to calculate the effective potentials, E, of buffered oxidants of types and at concentrations of practical interest.

Table V, column 5, however, gives the potentials actually measured in an electromotive cell similar to that described by Sherrill and Haas *(41)*. The cathode, of bright polished platinum, was immersed in one of the buffered redox systems described in columns 1 to 4 and agitated by means of a rotatory stirrer. The anode, of platinum black, was kept continuously bathed in pure gaseous hydrogen at slightly greater than atmospheric pressure and in buffer solution of the same composition and pH as that containing the redox system in the cathode compartment. Internal electrical communication between the anode and cathode half cells was by a film of the same buffer solution surrounding an intermediate glass stopper, so that liquid junction potential was a negligible factor. The over-all potential of the cell at 25° was determined to the nearest millivolt by suitable electrical methods *(41)* and came to equilibrium for the different redox systems in times varying from a few hours to 2 or 3 days. Equilibrium conditions were probably never quite attained for chlorite, hypochlorite, and the dioxides of nickel and cobalt since in these cases gas was evolved at the bright platinum electrode. These observed potentials (column 5) refer to a platinum-hydrogen electrode buffered to the pH given in column 4, but this reference potential, arbitrarily set at zero in all cases, actually altered with the pH of the buffer present. Since the relevant reaction at the platinum-hydrogen electrode is

$$H_2 = 2\ H^+ + 2e \qquad (9)$$

it can be shown that equation (8) reduces in this case to $E = E_o - 0.06 \times$ pH when the temperature is 25° C. and other quantities are expressed in c.g.s. units. Column 6 gives the effective potentials, E, of the various redox systems referred to a platinum-hydrogen electrode corrected to the standard pH of zero (molar hydrogen ion activity) but not corrected for slight variations in hydrogen pressure or for any buffer effects. These effective potentials were therefore determined upon a roughly comparable basis by direct experiment.

Reference to the observed potentials for periodate systems (Column 5, runs 1 to 6) shows that the reproducibility of the measurements was ±0.02 volts

and that a change from sodium to potassium salts was of little consequence. It is interesting to note that if the periodate reaction be assumed as $IO_3^- = IO_4^- + 2H^+ + 2e$, combination of this equation with (9) gives $H_2 + IO_4^- = IO_3^- + H_2O$ for the overall reaction of the cell. Since the latter equation is independent of pH, the observed potentials should also be independent of pH as long as the ratio $(IO_4^-)/(IO_3^-)$ is constant. The $E_{obs.}$ values are indeed constant at -1.49 ± 0.05 volts over the pH range 3.5 to 11.2 (runs 2 to 6) but increase to -1.64 volts at pH 0.9. This discrepancy is probably caused by the increased amount of paraperiodate ion in the periodate-paraperiodate equilibrium (equation 1) when the solution is strongly acid, with the result that the potential actually measured became that of the more powerfully oxidizing system $H_2 + H_5IO_6 = H^+IO_3^- + 3\ H_2O$. Such a change with pH in the species containing a given valence state of an element emphasizes the need for measuring the effective potential of a system in a given environment rather than relying upon estimated values. Standard E_o potentials can sometimes be derived from the effective E value (column 6) by means of equation (8), although with much less certainty. Thus the calculated E_o potential for periodate at pH 0.9 is -1.68 volts and is -1.49 ± 0.05 volts at pH 3.5 to 11.2. The former figure checks Latimer's value of "circa -1.7 volt" for the paraperiodate ion at pH O and the latter agrees with that of -1.53 volts found by Abel and Smetana *(42)*. In the same way, the E_o potentials calculated from dichromate at pH 3.4 (run 18) and from permanganate at pH 1.8 (run 11) are -1.35 and -1.54 volts, respectively, and check those of Latimer (-1.36 and -1.52 volts). Other measurements in Table V sometimes give E_o potentials different by several tenths of a volt from those of Latimer, and the divergence may originate in either experimental or theoretical shortcomings.

Column 6 shows that the effective oxidation potentials for periodate at pH 3.5 to 4.5, tetravalent lead at pH 2.5, perbismuthate at pH 4.5 and persulphate at pH 1.8 were -1.2 to -1.3, -1.15, -1.19 and -1.18 volts respectively. It thus appears that the four oxidants have substantially the same effective potential of about -1.2 volts in pH ranges of greatest practical interest for the dialdehyde cleavage. The correspondence between the E_o values of -1.6 to -2.0 volts (Table II, group 1) therefore receives support, although it is unfortunate that the effective potential of the persulphate-silver couple was not examined in the same way. Of the oxidants of Table II, group 2, permanganate at pH 3.5 and dichromate at pH 0.9 have effective potentials (Table V, column 6, runs 11 and 16) in the group 1 range, although they fail to cause the dialdehyde cleavage of glycols.

Critical Oxidation Potentials

Although according to some theories a difference, no matter how small, in the redox potentials of two substances should cause one to oxidize the other, in practice the rate of oxidation often remains negligible

TABLE V.—OBSERVED OXIDATION POTENTIALS AT 25°

Run No.	Redox System at Cathode: Oxid./Red. (1)	Moles per Liter (2)	Buffer [a] (3)	pH (4)	$E_{obs.}$ [b] (5)	Effective E Value [c] at Cathode (6)
	Group 1 Oxidants					
1	$NaIO_4/NaIO_3$ [d]	0.100/0.100 0.033/0.033	4.3 *M* H_2SO_4	0.9	1.63 1.66	1.61
2	KIO_4/KIO_3	0.011/0.011	0.1 *M* acetate	3.5	1.52 1.48 1.47	1.32 1.28 1.27
3	$NaIO_4/NaIO_3$ [e]	0.100/0.100	0.1 *M* acetate	4.2	1.56	1.29
		0.033/0.033	0.1 *M* acetate	4.2	1.54	1.27
4	KIO_4/KIO_3	0.011/0.011	0.1 *M* acetate	4.5	1.47 1.48 1.47	1.20 1.21 1.20
5	KIO_4/KIO_3	0.026/0.005	1 *M* phosphate	8.2	1.49 1.49	1.01 1.01
6	KIO_4/KIO_3	0.026/0.0076	1 *M* carbonate	11.2	1.46 1.43	0.80 0.77
7	$Pb(OAc)_4/Pb(OAc)_2$	0.061/0.065	99+% acetic acid	...	1.3-1.5	...
8	$PbO_2/Pb(OAc)_2$	sat./0.100	1 *M* acetic acid	2.5	1.3	1.15
9	$NaBiO_3/BiO^+$	sat./sat.	0.1 *M* acetate	4.5	1.46	1.19
10	$K_2S_2O_8/KHSO_4$	0.073/0.033	4 *M* acetic acid	1.8	1.29	1.18
		0.073/0.036	0.1 *M* acetic acid	3.5	1.36	1.16
		0.029/0.033	0.1 *M* phosphate	6.6	1.39	1.00
	Group 2 Oxidants	0.146/0.073	0.1 *M* phosphate	8.6	1.52	1.01
11	$KMnO_4/Mn(OAc)_2$ [f]	0.061/0.014	4 *M* acetic acid	1.8	1.49	1.38
		sat./0.0076	99+% acetic acid	...	1.3-1.4	...
		sat./0.0046	0.1 *M* acetate	3.5	1.46	1.26
12	$MnO_2/Mn(OAc)_2$	sat./0.100	*M* acetate	2.5	1.08	0.93
13	$NiO_2/Ni(OAc)_2$ [g]	sat./0.100	*M* acetate	5.6	1.2-1.3	0.87-0.97
14	$CoO_2/Co(OAc)_2$ [g]	sat./0.100	*M* acetate	5.6	1.2-1.3	0.87-0.97
15	$K_2Cr_2O_7/Cr_2(SO_4)_3$	0.0004/sat.	0.1 *M* H_2SO_4	0.9	1.17	1.12
16	$K_2Cr_2O_7/KCr(SO_4)_2.12\ H_2O$	0.017/0.003	0.1 *M* H_2SO_4	0.9	1.15	1.10
		0.208/0.007	0.1 *M* H_2SO_4	0.9	1.18	1.13
		0.433/0.006	0.1 *M* H_2SO_4	0.9	1.20	1.15
		0.075/0.006	4 *M* acetic acid	1.8	1.11	1.00
		0.221/0.005	4 *M* acetic acid	1.8	1.15	1.04
17	$K_2Cr_2O_7/Cr_2(SO_4)_3$	0.0007/sat.	0.01 *M* H_2SO_4	1.9	1.09	0.98
18	$K_2Cr_2O_7/KCr(SO_4)_2.12\ H_2O$	0.075/0.006	0.1 *M* acetic acid	3.1	1.12	0.92
		0.0168/0.033	0.1 *M* acetic acid	3.4	1.09	0.89 [e]
	Other Oxidants				1.15	0.95
19	V_2O_5	sat.	1 *M* acetic acid	2.5	0.93 0.90	0.78 [e] 0.75
20	$V_2O_5 + H_2O_2$	sat.	1 *M* acetic acid	2.5	1.00 1.03	0.85 0.88
21	V_2O_5	sat.	0.1 *M* acetate	4.5	0.99	0.71 [e]
22	K_2SeO_4/K_2SeO_3	0.100/0.100	1 *M* acetate	3.5 3.5	0.73 0.66	0.53 0.46 [e]
23	$NaClO_3/NaCl$ [g]	0.100/0.100	0.1 *M* phosphate	6.6	1.32	0.93
24	$NaClO/NaCl$ [h]	active Cl 0.027N	None	6.06	0.94	1.19
25	H_2O_2/H_2O	0.33/H_2O	*M* acetate	4.2	0.83	

(a) Sodium or potassium salts to agree, when possible, with cation in Redox system.
(b) Convention requires a negative sign throughout. Experimental values against platinum-hydrogen electrode at pH given in column 4.
(c) Convention requires a negative sign throughout. Potentials refer to platinum hydrogen electrode at pH O.
(d) No decomposition of periodate.
(e) Periodate decomposed at rate of about 0.1% per hour.
(f) Precipitated MnO_2 at pH 3.5.
(g) Unstable. Evolved gas and data approximate.
(h) Observed by Mr. R. U. Lemieux and Mr. G. H. Segall against saturated calomel electrode at 20°.

until the potential difference is considerable. . .The "critical oxidation potential" was defined by Fieser *(43)* as that at which the velocity of oxidation of a given substrate, in this case cellulose or starch, becomes vanishingly small. It is the minimum effective potential necessary to oxidize a given substance in the prevailing environment. Fieser pointed out that the addition of the substrate would not alter the observed equilibrium potential of a redox system that failed to cause oxidation. If oxidation occurred, the ratio of oxidized to reduced forms in the redox system would be diminished and the observed potential would promptly alter by many millivolts according to equation *(8)*. This inference was checked by adding small amounts of solid, specially purified soluble starch *(5)* to the cathode half-cell after the equilibrium data of Table V, column 5, were obtained. In many cases the addition caused an easily observable shift in the measured potential. Similar shifts occurred when the initial ratio of oxidized to reduced forms in the redox system was widely varied and the pH was kept constant, as in runs 16 at pH 0.9 and 1.8.

Periodate is known to oxidize ethylene glycol very rapidly in acid solution but the rate of oxidation falls to a minimum at pH 5. The rate then rises somewhat to a maximum at pH 8 and assumes very low values in more alkaline media *(11)*. Soluble starch behaves in a similar way (5, Fig. 1) but the maximum at pH 8 has not been demonstrated. The essential fact for present purposes is that periodate is capable of oxidizing starch in a strongly alkaline range (pH 11.2) where the effective potential is about −0.8 volt. It follows that the critical oxidation potential of cellulose or starch with respect to periodate at 25° is somewhat less than −0.8 volt. On the other hand, the addition of the soluble starch to the dichromate system at pH 3.4 (marked with an asterisk) failed to alter the equilibrium potential of —0.89 volt by as much as millivolt during 30 minutes of observation. When the potential was increased to −0.92 volt by increasing the ratio of dichromate to chromium ion, the oxidation of the added starch was readily demonstrated (Table V, run 18). Clibbens and Ridge *(44)* found that aqueous dichromate had a negligible action on cotton unless acids were present. The results show that the critical oxidation potential of starch or cellulose toward dichromate at 25° is about −0.9 volt, or is at least 0.1 volt larger than the value for periodate.

Although the measurements for the other oxidants of Table V are of a preliminary nature, they demonstrate that selenates and vanadates have potentials too small to oxidize starch at an appreciable rate (runs 19, 21, and 22). Oxidation did occur when the vanadate potential of −0.78 volt was "stepped-up" to −0.85 volt by the presence of hydrogen peroxide (run 20). The mechanism of this process remains a matter for further research. The potential of −0.93 volt at pH 6.6 recorded for the sodium chlorite/sodium chloride couple is larger than the value of −0.79 volt published for chlorite at pH 4 *(45)* but it is doubtful whether NaCl or ClO_2 is the proper reduced form of the oxidant in the present experiments *(45)*. When the redox reaction is assumed to be $HClO_2 = ClO_2 + H^+ + e^-$, Latimer's E_o value of −1.26 volts corresponds to an effective potential of —0.86 volt at pH 6.6. Since chlorite is well known to have no appreciable effect upon cellulose *(6, 45)* or nonreducing, simple carbohydrates *(46)*, the critical oxidation potential for the chlorite -cellulose system is certainly more than −0.79 volt and probably more than −0.85 volt. The latter value happens to be the minimum recorded for hypochlorite (at pH 11 to 12) *(47, 48)* but in these circumstances hypochlorite still oxidizes cellulose at a measurable rate *(47)* and must possess a critical potential smaller than −0.85 volt. These observations amount to the conclusion that chlorite, but not hypochlorite, is capable of bleaching cellulose without risk of damage by oxidation *(45)*.

The chemical results of the oxidation of cellulose or starch by periodate and dichromate are known to be different *(5)* and are not incompatible with the special electronic mechanism suggested for periodate in this article. Since periodate and dichromate also have different critical oxidation potentials, it may be that the latter are characteristic of the oxidation mechanism. Periodate, perbismuthate, tetravalent lead and trivalent silver, e.g., may prove to have the same critical potential toward a given glycol, whereas a different value would pertain to any other possible oxidants of the dichromate class. Conversely, the fact that oxidations by chlorite and hypochlorite involve the reduction of these substances to different end products, chlorine dioxide and chloride, respectively *(45)*, suggests that the oxidative mechanisms differ. This inference is not incompatible with the presumed difference in critical oxidation potentials. It must be emphasized that the experimental basis for such theoretical speculations still seems quite inadequate either to prove or disprove them. They involve the assumption that the fundamental electronic mechanism of a given redox system upon a given substrate is independent of pH and is therefore independent of the various ionic and other forms the oxidant may assume as the pH varies. The literature contains discussions of the forms assumed by periodate *(11, 12)* hypochlorite *(47, 48)* and chlorite *(45)*, but the pH range in which studies of their oxidative mechanism can be made is limited by the fact that the initial products, reducing oxycelluloses, are unstable in presence of alkali.

Experimental

Materials

The soluble starch used in this and a previous *(5)* research stained clear blue with iodine, had 0.15% ash, 0.1% phosphorous, 0.6% ethoxyl, and an almost imperceptible copper number. The ethylene glycol was a high-grade commercial sample.

The sodium perbismuthate was the commercial, insoluble brown powder containing about 85% $NaBiO_3$ and was used without further purification. It was readily analyzed by boiling an 0.1 to 0.2 gram sample in excess of normal hydrochloric acid through which a stream of carbon dioxide was passed. The chlorine evolved was trapped in an excess of aqueous potassium iodide and the iodine so liberated was titrated with standard thiosulphate. The black, insoluble, hydrated dioxides of nickel and cobalt were prepared immediately before use by Howell's method *(49)*, in which ice cold, aqueous solutions of nickelous and cobaltous sulphates were oxidized by sodium hypochlorite in strong caustic soda. After very thorough washing in water, the black, spongy precipitates were kept under water containing no acid, since they evolved oxygen readily even at pH 6. Lead dioxide was obtained by suspending red lead in normal acetic acid or by pouring an acetic acid solution of lead tetraacetate in water. It was washed thoroughly but not dried, since drying reduced its oxidative power,

presumably by obliterating most of its colloidal surface. The same precaution was observed with manganese dioxide, which was precipitated from aqueous potassium permanganate by hydrogen peroxide or sulphurous acid.

PROCEDURE IN OXIDATIONS (SEE TABLES III AND IV)

The aqueous solution of the ethylene glycol or soluble starch contained enough acid, or buffer mixture, to maintain the pH practically unchanged throughout the oxidation. A known amount of the oxidant, either in aqueous solution or not, was then added all at once to the substrate, which was mechanically stirred and kept near 20°C.

When the oxidation of the soluble starch by the perbismuthate was complete, the bismuth salts were removed with the centrifuge and the oxidized starch was precipitated from the supernatant liquor with methanol. After drying by solvent exchange and *in vacuo* at room temperature, the product was analyzed for the dialdehyde cleavage both by the glyoxal tetramethyl acetal *(5)* and the hydroxylamine hydrochloride method *(50)*. When ethylene glycol was used, the oxidized mixture was filtered if necessary and aliquots of the clear liquid were analyzed for formaldehyde by precipitating and weighing the 2, 4-dinitrophenylhydrazone. Since this procedure was exactly that employed in estimating glyoxal *(5)*, any glyoxal, or glycollic aldehyde ($CH_2OH.CHO$) present was precipitated simultaneously as glyoxal-*bis*-2, 4-dinitrophenylhydrazone. The entire precipitate was washed, dried at 100°C., and weighed. Extraction with alcohol readily dissolved the formaldehyde hydrazone and the weight of the undissolved residue was that of the highly insoluble glyoxal derivative. Solutions containing only formaldehyde were also estimated by the hydroxylamine hydrochloride and the dimethone methods. The results agreed to within ± 1% with those obtained by using 2,4-dinitrophenylhydrazine.

Acknowledgment

The authors wish to thank the following organizations for contributions which helped to defray the cost of the research: The Fundamental Research Committee of the Technical Association of the Pulp and Paper Industry, E. I. du Pont de Nemours and Company, The Hercules Powder Company, and the Mathieson Alkali Works.

Literature Cited

1. Malaprade, M. L., *Bull. soc. chim.* [4], 43: 683 (1928); [5], 1: 833 (1934); [5], 4: 906, 1375 (1937).
2. Fleury, P., and Lange, J., *J. pharm. chim.* 17: 196, 313, 409 (1933).
3. Jackson, E. L., and Hudson, C. S., *J. Am. Chem. Soc.* 59: 2049 (1937); 60: 989 (1938).
4. Caldwell, C. G., and Hixon, R. M., *J. Biol. Chem.* 123: 595 (1938).
5. Grangaard, D. H., Gladding, E. K., and Purves, C. B., *Tech. Assn. Papers* 25: 385 (1942).
6. Rutherford, H. A., Minor, F. W., Martin, A. R., and Harris, M., *J. Research Natl. Bur. Standards* 29: 131 (1942).
7. Jayme, G., Sätre, M., and Maris, S., *Naturwissenschaften* 29: 768 (1941); *Chem. Abs.* 38: 2197 (1944).
8. Böseken, J., and Couvert, H., *Rec. trav. chim. Pays Bas* 40: 354 (1921).
9. Criegee, R., Kraft, L., and Rank, B., *Ann.* 507: 159 (1933-34).
10. Criegee, R., *Ber.* 68: 665 (1935).
11. Price, C. C., and Kroll, H., *J. Am. Chem. Soc.* 60: 2726 (1938).
12. Price, C. C., and Knell, M., *J. Am. Chem. Soc.* 64: 552 (1942).
13. Jackson, E. L., *Organic Reactions* 2: 341 (1944).
14. Criegee, R., *Ber.* 64: 260 (1931); 65: 1770 (1932).
15. Criegee, R., *Ann.* 495: 211 (1932).
16. Hockett, R. C., Dienes, M. T., and Ramsden, H. E., *J. Am. Chem. Soc.* 65: 1474 (1943), and numerous earlier articles.
17. Cramer, F. B., Hockett, R. C., and Purves, C. B., *J. Am. Chem. Soc.* 61: 3463 (1939).
18. Gardner, T. S., and Purves, C. B., *J. Am. Chem. Soc.* 64: 1539 (1942).
19. Mahoney, J. F., and Purves, C. B., *J. Am. Chem. Soc.* 64: 9 (1942).
20. Criegee, R., *Angew. Chem.* 50: 153 (1937). A review article.
21. Criegee, R., *Ann.* 522: 75 (1936). See also Criegee, R., Marchand, B., and Wannowius, H., *Ann.* 550: 99 (1943); *Chem. Abs.* 37: 2720 (1943).
22. See, for example, Pauling, L., "The Nature of the Chemical Bond," Cornell University Press, Ithaca, N. Y. (1940).
23. Helmholz, L., *J. Am. Chem. Soc.* 59: 2036 (1937).
24. Rogers, M. T., and Helmholz, L., *J. Am. Chem. Soc.* 63: 278 (1941).
25. Keller, R. N., *J. Chem. Educ.* 18: 134 (1941) briefly reviewed Werner's theory and gave references.
26. Moore, W. J., and Pauling, L., *J. Am. Chem. Soc.* 63: 1392 (1941).
27. Gross, S. T., *J. Am. Chem. Soc.* 65: 1107 (1943).
28. Bauer, S. H., and Beach, J. Y., *J. Am. Chem. Soc.* 63: 1394 (1941).
29. Stillwell, C. W., "Crystal Chemistry," McGraw-Hill Book Co., New York, 1938. Table 127, p. 424.
30. Stillwell, C. W., ref. 29, p. 12.
31. Stillwell, C. W., ref. 29, p. 261 et seq.
32. Latimer, W. M., "Oxidation Potentials," Prentiss-Hall, New York, 1938.
33. Yost, D. M., *J. Am. Chem. Soc.* 48: 152 (1926).
34. Noyes, A. A., DeVault, D., Corvell, C. D., and Deahl, T. J., *J. Am. Chem. Soc.* 59: 1326 (1937).
35. Baer, E., Grosheintz, J. M., and Fischer, H. O. L., *J. Am. Chem. Soc.* 61: 2607 (1939).
36. Grosheintz, J. M., *J. Am. Chem. Soc.* 61: 3379 (1939).
37. Criegee, R., and Büchner, E., *Ber.* 73: 563 (1940).
38. Criegee, R., Büchner, E., and Werner, W., *Ber.* 73: 571 (1940).
39. Crowell, W. R., Heyrovsky, J., and Engelkemer, D. W., *J. Am. Chem. Soc.* 63: 2888 (1941).
40. Thiesse, X., *Bull. soc. chim.* 7: 495-526 (1940). The authors thank Dr. R. F. Conway of the du Pont Company for drawing their attention to this important article. *Chem. Abs.* 36: 3448 (1942).
41. Sherrill, M. S., and Haas, A. J., *J. Am. Chem. Soc.* 58: 952 (1936).
42. Abel, E., and Smetana, O., *Monatsh.* 60: 181 (1932).
43. Fieser, L. F., *J. Am. Chem. Soc.* 52: 5204 (1930).
44. Clibbens, D. A., and Ridge, B. P., *J. Text. Inst.* 18: T 135 (1927).
45. Taylor, M. C., White, J. F., Vincent, G. P., and Cunningham, G. L., *Ind. Eng. Chem.* 32: 899 (1940).
46. Jeanes, A., and Isbell, H. S., *J. Research Natl. Bur. Standards* 27: 125 (1941).
47. Hisey, W. O., and Koon, C. M., *Tech. Assoc. Papers* 19: 293 (1936).
48. Remington, V. H., and Trimble, H. M., *J. Phys. Chem.* 33: 424 (1929).
49. Howell, O. R., *J. Chem. Soc.* 65: 669 (1923), and other articles.
50. Gladding, E. K., and Purves, C. B., *Tech. Assoc. Papers* 26: 119 (1943).

TAPPI Notes

Arthur J. Edward, formerly of the New Brunswick International Paper Company is now superintendent of the Control Department of the Canadian International Paper Company, Three Rivers, P. Q.

W. J. Alford III is now Assistant to the President, Continental Paper Company, Ridgefield Park, N. J.

Maxwell H. Boyce has been transferred from the Louisville Neoprene Works to the Dyestuffs sales staff of E. I. du Pont de Nemours, 7 So. Dearborn Street, Chicago 3, Ill.

The Watertown Group of the TAPPI Empire State Section will meet at the Woodruff Hotel, Watertown, N. Y. at 7 p.m. Thursday, September 13, 1945. Henry L. Mellen of the Hercules Powder Company, Holyoke, Mass., will talk on Sizing and Size Extenders. All meetings of this group will be held on the second Thursday of each month.

The Don L. Quinn Company, Container and Materials Testing Laboratory, is now located at 224 West Kinzie Street, Chicago 11, Ill.

C. V. Holmberg, formerly of the Crossett Lumber Company, is now on the staff of the New York State College of Forestry, Syracuse 10, N. Y.

Albert K. Roach, formerly of W. C. Ritchie & Company, is now paper chemist for the William H. Welsh Company, 7943 So. La Salle Street, Chicago 20, Ill.

Clifford Reynolds is now Technical Director of the Coos Bay Pulp Corporation, Empire, Ore.

Edward T. Street is now Vice President in charge of sales for the Downingtown Manufacturing Company, Downingtown, Pa.

William J. Walker is now General Superintendent of the Maine Seaboard Paper Company, Bucksport, Maine.

John F. Carroll is now located at 35 Walnut Street, Turners Falls, Mass.

Report of Graphic Arts Committee—1944*

By R. H. Simmons[1]

During the past year, the Graphic Arts Committee changed its chairman. Mr. M. S. Kantrowitz, who has filled this position for the past three years, found it necessary to resign because of ill health. The present chairman was appointed August 25, 1944, and since that time endeavored to obtain an interesting program for the Graphic Arts Session which was to be held in February, 1945.

The committee started the year with an agenda of nine subjects to be developed:

No. 181 Surface strength of paper.
No. 182 Oil penetration of paper.
No. 183 Smoothness of paper.
No. 184 Air resistance of paper.
No. 185 Paper and ink bibliography.
No. 186 Printing processes bibliography.
No. 187 Effect of humidity and temperature upon paper, ink, press rollers, and printing processes.
No. 188 Covering power of printing ink.
No. 189 Correlation of laboratory tests with printing quality of paper.

Items Nos. 181, 182, and 184 have been completed, submitted to the Paper Testing Committee, and have been adopted by the Technical Association.

Item No. 183 has been submitted to Subcommittee I of Committee D-6, Methods of Testing Paper and Paper Products, American Society for Testing Materials, and is being processed by them. This method has been rewritten for submission to the Paper Testing Committee of TAPPI.

The work on items 185 and 186 have not advanced very far because of the pressure of war work. Some work has been done but not sufficient to publish a report.

Item No. 187 is somewhat in the class with the two items on bibliography. It was the desire of Mr. Kantrowitz to compile as much pertinent data as possible on this subject and then publish the compilation. This appears to be a good project to continue.

Item No. 188 is a subject which is vital to all printers but the number of variables involved are innumerable and, although we will continue to list this among our active projects, it is doubtful that a satisfactory solution will be reached in the near future.

Cooperation is Needed

Item No. 189 involves a number of tests, and to obtain a proper conclusion, each test method should be correlated with the various types and grades of paper and the use of these papers in the printing processes to which the papers are adapted. It will require the cooperation of printing plants maintaining good laboratory staffs and printing in four colors by both letterpress and offset. Many other classes of printing should also be included. It can be seen that this is a large project which must be whittled down gradually.

The committee meeting which was to be held during the annual meeting was canceled and the chairman is endeavoring to carry on by mail. Each member of the committee has been asked to supply a subject for consideration. It is expected that a fund of new projects will be developed for future committee work.

Two suggested new projects are the study of the abrasive characteristics of coated papers, more especially machine coated, and the surface ink receptivity of papers. These are both pertinent to the printing quality of paper.

* Presented by title at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 19-22, 1945.

[1] Member TAPPI; Chairman, Graphic Arts Committee; Assoc. Chemist, U. S. Government Printing Office, Washington, D. C.

New TAPPI Members

George A. Balko, The Mead Corporation, Chillicothe, Ohio, a 1918 graduate of the Stevens Institute of Technology.

Francis R. Boyle, Technical Representative of the American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y., a 1942 graduate of the New York State College of Forestry.

Alfred S. Brown, Research Director, Skenandoa Rayon Corp., Utica, New York, a graduate of Rensselaer Polytechnic Institute in 1926, and of Yale University in 1929.

Lawrence E. Bulger, Paper Technician, Hollingsworth & Whitney Co., Winslow, Maine.

Clarence L. Bunge, Technical Supervisor, Crown-Zellerbach Corp., Port Townsend, Wash., a 1935 graduate of Washington State College.

Andrew A. Cummins, President, Cummins & Barnard, Inc., Consulting Engineers, 205 State Savings Bank Bldg., Ann Arbor, Mich. Attended the University of Kansas.

Arnold Duecker, Coating Supervisor, The Flintkote Co., Meridian, Mississippi, a 1930 graduate of Missouri University.

George H. Pountain, General Superintendent, International Paper Company, Corinth, New York.

Charles N. Rogers, Pulp and Paper Mill Engineer, Sonoco Products Co., Hartsville, S. C., a 1935 graduate of North Carolina State College.

Miss H. Gladys Swope, Fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa., a 1929 graduate of the University of Chicago.

Alexander W. Tait, Engineer, West Virginia Pulp & Paper Co., 230 Park Ave., New York, N. Y. Attended Pratt Institute and Cooper Union.

Goes to Johnson and Wierk

Charles J. Campbell, for the last 10 years process engineer for Kimberly-Clark corporation at Neenah, Wis., left for New York City last week where he will be associated with the Johnson-Wierk Consulting Engineers. A director of the Wisconsin Professional Engineers' society, Mr. Campbell also was active in Neenah Kiwanis club activities.

Williamson Joins Powell River

A. H. Williamson, former Timber Controller for Canada, has been elected to the board of directors of the Powell River Company Limited, of Powell River, B. C. He will represent the new shareholders added by the recent sale of 300,000 shares of the ordinary stock to the general public.

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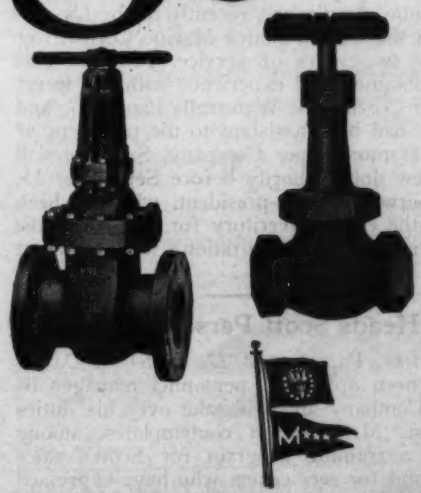

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New York Paper and Pulp Market Review

WPB Revokes Many Important Restrictions On Production and Use of Major Paper Items—July Pulpwood Receipts Decline—New And Old Rags Are Active—Mill Inventories of Paper Stock Rise.

Office of the PAPER TRADE JOURNAL,
Wednesday, August 30, 1945.

No material improvement in the paper supply situation is reflected in market opinion at this date. It is, of course, too soon after total victory to expect any actual increase in paper for trade distribution but the trend to normalcy has begun.

Discontinuance of many important restrictions on the manufacture and consumption of many paper items has been made during the past week and more controls will be lifted in the near future. Paper mills are now in a good position to start making improvements, replace outworn and obsolete equipment. Manpower is now returning to peacetime production but the dislocations of war were so great that it will take time to effect them. Rapid progress is, however, being made in the work of reconversion to a peacetime economy. The reconversion problem is not important in the paper and pulp industry although various adjustments must be made and the industry is expected to make rapid strides.

Demand for all major types of paper continues high above current supply. The only major paper that will probably continue relatively scarce during the current quarter is newsprint. Overseas requirements for maintaining a free press in Western Europe are creating shortages of print paper in the domestic market. Easement of the acute situation is expected in the final quarter of this year.

The index of general business activity for the week ended August 18, caused by V-J Day, declined to 112.5, from 137.5 in the preceding week, compared with 142.7 in the corresponding week in 1944. The index of paperboard production was 107.3, compared with 151.9 in the preceding week, and with 158.1 in the corresponding week in 1944.

Paper production for the week ended August 18 was estimated at 67.8%, compared with 90.4% for 1944, with 90.9% for 1943, with 81.2% for 1942, and with 102.8% for the corresponding week in 1941.

Paperboard production for the week ended August 18 was 93.0%, compared with 95.0% for 1944, with 95.0% for 1943, with 74.0% for 1942, and with 94.0% for the corresponding week in 1941.

Pulpwood

Pulpwood receipts of 1,580,000 cords in July, compares with 1,593,000 cords in June. If war prisoners are returned to Europe relatively soon, opinion in some quarters expresses doubt that the current output of wood can be maintained in the South. On the other hand, more manpower is expected to return to the woods and the future supply of trucks and tires seems assured.

Wood Pulp

Swedish pulp imports from V-E Day through August 8 are reported to aggregate 40,060 tons, of which 20,548 tons were unbleached sulphate; 123 tons bleached sulphate; 15,254 tons unbleached sulphite; 1,905 tons bleached sulphite, and 2,230 tons of rayon and other special grades.

Rags

Cotton cuttings continue in active demand, As was expected to occur, mills are beginning to insist that packings should now be more widely resumed to the pre-war standards. Prices are firm at ceiling levels.

Old cotton rags continue active. Demand of felting mills continue relatively heavy on resumption of trading after V-J Day. This demand is likely to be maintained and even increased as consumer requirements for more roof and floor covering materials is expected to be very large from now on. Prices are firm at ceiling levels.

Old Rope and Bagging

Rope and cordage fibers of Manila and agave only, continue to be subjected to domestic sales restrictions, the WPB reported in removing its restriction on special sales of most excess and surplus materials held by the government.

Trading in old bagging is currently reported as relatively quiet. No evidence of increased buying by the automotive industry has been reported this week. Prices are unchanged.

Old Waste Paper

Mill receipts of waste paper in July continued to rise above consumption, thus indicating continued and gradual rise in mill inventories. Inventories are favorable largely in the low, bulky grades of paper stock. White paper grades of waste paper are lower than in 1944.

Austin Joins Fox River Sales

APPLETON, Wis., August 27, 1945—The Fox River Paper Corporation announces the appointment of Arthur C. Austin as eastern manager with headquarters at the corporation's New York office at 350 Madison Avenue. Austin was recently honorably discharged from the United States Marine Corps after approximately two years of service. Prior to that time he had obtained mill experience with the International Paper Co. and the Waterfalls Paper Co., and more recently had been assistant to the president of the Bulkley, Dunton Paper Company, S.A. He will assume his new duties shortly before September 15. David E. Oberweiser, vice-president, who has been in charge of the eastern territory for the past three years is returning to the corporation's home office at Appleton.

Preston Heads Scott Personnel Work

PHILADELPHIA, Pa., August 27, 1945—G. Davies Preston has been appointed personnel manager of Scott Paper Company and will take over his duties September 1st. Mr. Preston contemplates, among other things, a training program for Scott's sales organization and for servicemen who have expressed their desire to resume duties in this branch, it will serve as a complete refresher course. Having joined the Scott Paper Co. in 1934.

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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, August 29, 1945.

BLANC FIXE—The market for blanc fixe is reported unchanged for the week. Current demand is reported fair. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton.

BLEACHING POWDER—Demand is currently reported active. Supply situation reported satisfactory. Bleaching powder is currently quoted at from $2.50 to $3.10 per 100 pounds. All prices in car lots, in drums, f.o.b. works. May output higher at 2,708,000 pounds.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b. shipping point. Imported, 21 to 23 cents per pound. All requests filled.

CAUSTIC SODA—Supply situation continues short, with production good and very heavy all-over demand. Combined stocks lower at 55,886 tons. Solid caustic soda is currently quoted at $2.30 per 100 pounds. The flake and ground are currently quoted at $2.70 per 100 pounds. All prices in car lots, in drums, f.o.b. works.

CHINA CLAY—Demand for some grades of china clay is reported fair this week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mines. Imported china clay is currently quoted at from $13 to $25 per long ton, ship side.

CHLORINE — All-over demand heavy. Essential requirements met. May output up at 110,746 tons. Prices unchanged. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b. works.

ROSIN—Light offerings at new OPA ceiling price: "G" gum rosin at $6.74 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $6.70 per 100 pounds in barrels, New York. Average price of 70% gum rosin size is currently offered at $6.95 per 100 pounds, f.o.b. works. Conservation Order M-387 of February 28, limits rosin to 70% of 1944 quota for paper.

SALT CAKE—Demand reported moderate. Quotations on salt cake continue to remain unchanged. Domestic salt cake is currently quoted at $15 per ton; chrome cake at $16 per ton.

SODA ASH—Market requirements for soda ash continue heavy. Production at capacity. May output lower at 206,019 tons. Bulk deliveries prompt; bagged lots slow. Prices continue unchanged. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Market supply of cash corn reported fair this week. Corn prices less firm. Starch quotations continue unchanged. Pearl is currently quoted at $3.72 per 100 pounds. The powdered grade is currently quoted at $3.83 per 100 pounds. All prices f.o.b. Chicago.

SULPHATE OF ALUMINA—Supply situation reported good. Quotations are unchanged. Prices on the commercial grades are quoted at from $1.15 to $1.25 per 100 pounds. The iron free is currently quoted at $1.75 per 100 pounds. All prices in car lots, in bags, f.o.b. works.

SULPHUR—Demand is reported active for sulphur. Quotations on all grades continue unchanged. Annual contracts are currently quoted at $16 per long ton, f.o.b. mines. The current contract prices at Gulf Ports remains unchanged at $17.50 per long ton.

TALC—The market for domestic talc is reported fair this week. Quotations unchanged. Domestic grades are quoted at from $16 to $21 per ton, at mines. Canadian $24 per ton. All prices in car lots.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—			
Roll, contract	*$61.00	@	—
Sheets	69.00	@	—
* OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, Delivered			
Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—
* OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.30	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.	5.75	"	6.00
Boards, per ton—			
News	*50.00	@	—
Chip	*50.00	"	—
Sgl. Mla. L1. Chip	*62.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers
100% Rag Ext. No. 1	$39.10 @ $46.00		$40.25 @ $47.25
100% Rag	32.20 " 37.75		33.35 " 39.25
85% Rag	"		29.90 " 35.00
75% Rag	23.00 " 27.00		24.15 " 28.25
65% Rag	"		22.80 " 27.75
50% Rag	18.70 " 22.75		19.90 " 24.25
25% Rag	16.40 " 20.00		17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers
No. 1	$10.55 @ $12.75		$11.70 @ $14.25
No. 2	9.65 " 11.75		10.80 " 13.25
No. 3	9.20 " 11.25		10.35 " 12.50
No. 4	8.90 " 10.75		10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Bank Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.30
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	12.38
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$86.00
Unbl. Softwood Sulphite	74.00
Bl. Hardwood Sulphite	83.50
Unbl. Hardwood Sulphite	71.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich .. 72.00 @	82.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate	82.00
S. Semi Bleached Sulphate	75.00
N. Unbl. Sulphate	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	76.00
Unbl. Soda	72.00
Groundwood	50.00

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50% 80% Air Dry Weight
Northeast	11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.50*

*OPA Maximum Prices

WITCO CARBON BLACK No. 11

A dustless pelleted black especially produced to meet the requirements of paper manufacturers. Can be added directly to the beater in the shipping bag. Disperses readily and easily to impart a uniform black color to paper or cardboard. Samples on request.

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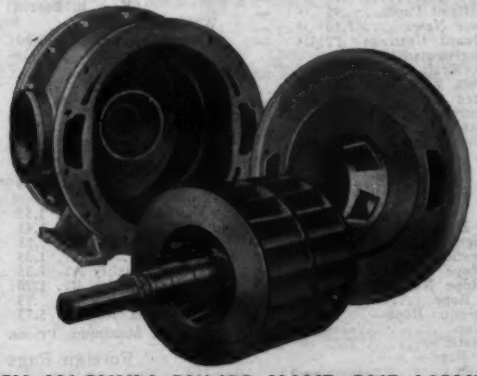

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Agawam Chemicals Inc.

LABORATORY AND OFFICES AT

WEST SPRINGFIELD • MASSACHUSETTS

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Thirds and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.30	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 3A	*1.35	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

Pre-War Quotations
All Prices Nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.25	@	3.30
Wool Tares, light	3.25	"	3.50
Wool Tares, heavy	3.50	"	3.75
Bright Bagging	3.25	"	3.50
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.50	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Prices.

Old Waste Papers

(F. o. b. New York)
OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Mixed Books	1.10	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Mixed Ledger, colored	2.00	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.95	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	1.10	"	—

Twines

All Prices Nominal
(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17½	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¾
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¾
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¾
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¾

Domestic Rags (Old)

White No. 1—Repacked	3.80	@	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	@	3.50
No. 1 Clean bright—			
Sisal Strings	.04	"	—
No. 2 Clean bright—			
Sisal Strings	.03	"	—
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)
OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Ledger, colored	2.00	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.00	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)
OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	—	"	1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.00	"	3.25
South American	—	"	3.25
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.65
New Zealand Wool Pouches	—	"	3.50
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Prices.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¾	"	.05
New White No. 1	.06¾	"	.07
New Light Flannelettes	.05¾	"	.06
Canton Flannels, Bleached	.06	"	.06¾
Underwear Cutters, Bleached	.06¾	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¾
New Black Silesias	.03	"	.03¾
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¾	"	.03½
New Canvas	.06¾	"	.06½
B. V. D. Cuttings	.06¾	"	.06½

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
Old Manila Rope	5.75	"	—*

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)
OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—

SCREENS for PAPER and PULP MILLS

PERFORMANCE of your Centrifugals, Shakers and Driners definitely improved by the use of precision screens built to your specifications. Let us "sit in" on your screening problems.

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ADAPTED TO YOUR LABORATORY NEEDS

In performance and equipment the Bausch & Lomb Paper Technologist's Microscope is especially adapted to meet every laboratory need of the paper technologist.

Assembled in collaboration with the Institute of Paper Chemistry to the specific requirements of the industry, its features include: a large stage . . . detachable, graduated mechanical stage . . . micrometer scale eyepiece . . . adjustable graduated draw tube, as well as other specialized accessories.

USES

Examinations of paper furnishes . . . speck analysis . . . fiber identification . . . beating characteristics of pulps . . . particle size of filler and other materials . . . surface characteristics of paper . . . photomicrographic work.

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HIGH GRADE COATED BOOK

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KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

MILLS:

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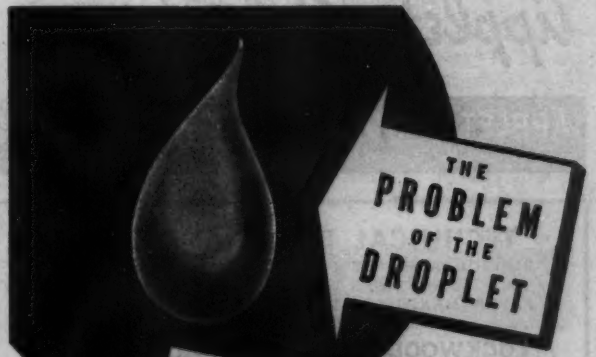
Williamsburg, Pennsylvania
Charleston, South Carolina



You who have never designed a felt probably don't realize the difficulties a simple drop of water can present. Surface tension, temperature, felt porosity, machine speed, pressure . . . all of these and more make the problem of water removal a real scientific puzzler.

Felt manufacture, therefore, is an art. That's why we point out the advantage of having a felt expert suggest felt clothing designed for your particular machine conditions. THE ORR FELT & BLANKET CO., Piqua, Ohio.

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FOR PULP & PAPER

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CAUSTIC SODA
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Carbon Bisulphide — Sulphur
Carbon Tetrachloride — Sulphuric Acid
Citric Acid — Sulphur Chloride
*Copperas — *Superphosphate
Cream of Tartar — Tartar Emetic
Muriatic Acid — Tartaric Acid
Nitric Acid — Titanium Tetrachloride

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Slitters and Roll Winders

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LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL

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WE MAKE ANY STYLE OR SIZE WANTED.

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APPLETON WOOLEN MILLS
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WRITE FOR BULLETIN 2200-P2
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a bigger profit—
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Bias Laid Rubber Paper Machine Aprons—Side Aprons—Water Box Covers—Color Box Covers—Cotton Deckle Webbing

RECORD PAPER & PULP STOCK VALVES "BONNETLESS SELF CLEARING" — — "RESIDUE POCKETLESS TYPE"

METALS — I.B.B.M., all iron, bronze or stainless steels, body parts plain or rubber lined.

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Our business is making pumps and after more than a quarter century spent in the design and production of pumps for every industry, we think we have the answer to your pumping problems.

Before purchasing new pumping equipment, consult with our engineering department. Let us first have a description of the conditions under which your pumps must work and tell us what kind of work your pumps must do.

Then outline the difficulties you may be experiencing with existing equipment and we will recommend a Frederick pump which in design and operation will do an efficient job in your plant.

THE Frederick IRON & STEEL CO.
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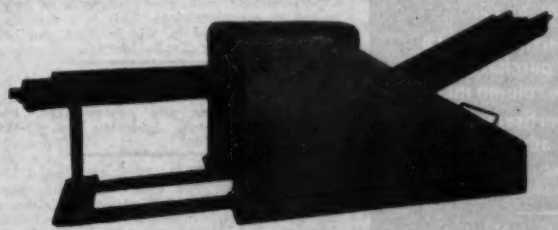

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This Taylor-Stiles Rag Cutter is built with the same attention as our five-tons-an-hour machine. Its capacity is 2000 tons an hour of cut rags.

TAYLOR-STILES & COMPANY 10 Bridge, Riegelsville, N. J.

In a mill producing facial or other tissues calling for gentle handling of the web, which winders or rewinders give the best service?
CAMACHINES OF COURSE !!!
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WANTED IMMEDIATELY

Designing Engineers, draftsman, detailers for post war work, excellent wages, pleasant working conditions. Write or phone:

Bagley & Sewall Company
Watertown, New York
A-30

HELP WANTED

For New Mill in Mexico making nine point straw:

3 Tour Bosses
3 Machine Tenders
3 Beater Men
1 Superintendent

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Development Chemist for Converting Plant located in the New York Metropolitan Area.

List all information in first letter and interview will be arranged promptly. Address Box 45-468 c/o Paper Trade Journal. S-6

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Flat and Square, Specialty Bags, Aniline Printing. Excellent opportunity for steady, well-paying future. Plant located in South. Write full details. Confidential. Box No. 45-478 care Paper Trade Journal. A-30

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Flat, Square, Shipping Sacks or Self-Opening. Top wage rates, rapid advancement, good future for experienced man. Write, giving full details. Our employees know of this ad. Location, New York City, Box No. 45-477 care Paper Trade Journal. A-30

SALARIED POSITIONS $2,500-$25,000. Post-war plans are creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated, through a procedure individualized to each client's requirements. Several weeks are required to negotiate and each individual must finance the cost of his own campaign. Retaining fee protected by refund provision. Identity covered and present position protected. Plan now for post-war security. Send only name and address for details. R. W. BIXBY, INC., 117 Delward Bldg., Buffalo 2, N. Y. TF

WANTED—2 Experienced Paper Mill Millwrights for Mill in Western U. S. Address Box 45-502 care Paper Trade Journal. S-13

HELP WANTED

CHARLES P. RAYMOND SERVICE INC.
294 Washington St., Boston, Mass.
Specializing in Paper Mill Personnel
Positions Now Open
Woodlands Manager, preferably one able to purchase and take full charge, attractive salary
Chemists, head chemists, laboratory man and asst. technical director
Tour boss, machine tenders, back tenders, 3rd and 4th hands
Plant engineers, draftsman, mechanical designers, electrical engineers, physicists
We invite correspondence (strictly confidential) with employers seeking personnel and men seeking new positions. A-30

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Old established financially sound export firm seeks capable man with broad export experience, thorough knowledge of paper and foreign market requirements and well connected with domestic sources to manage paper department: liberal profit-sharing and salary arrangement. Reply by letter stating age, education, experience: replies held confidential. Address Box 45-508 care Paper Trade Journal. A-30

CHEMIST—Paper Mill. Whiting Paper Company, Holyoke, Mass. A-30

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Young Chemist, willing worker with plenty of initiative, previous knowledge of glue, pigment, varnish, paint, printing ink and paper industries will be helpful but is not essential, excellent opportunities for advancement AAA-1 company—very stable industry—Phila. area. Address Box 45-520 care Paper Trade Journal. A-30

TOUR FOREMAN OR BOSS MACHINE TENDER

for Fourdrinier operation on kraft bag and wrapping paper. Must be a good handler of men and know all phases of kraft paper making. Forty-eight hours per week at $275 per month. Steady and permanent job for experienced man not over 40 years old. Address Box 45-519 care Paper Trade Journal. A-30

MASTER MECHANIC

to take full charge of maintenance in Asphalt Roofing Plant. Western New York location. Excellent salary for the right man. Give full particulars in first letter. All replies in strictest confidence. Address Box 45-533, Paper Trade Journal. TF

WANTED—CHIEF CHEMIST for pulp and paper mill located on Pacific Coast. Apply in own handwriting giving references, experience and other pertinent information. Address Box 45-243 care Paper Trade Journal. TF

MACHINE TENDER for cylinder machine operations. Must be experienced at this particular kind of machine operations. Prefer high school graduate or equivalent. Address Box 45-293 care Paper Trade Journal. TF

CHEMICAL Company in metropolitan New York area has opening for a chemist familiar with the problems of paper coatings and finishes involving resins. Address Box 45-460 care Paper Trade Journal. A-30

WANTED — ENGINEERS — Capable of handling general engineering work in established consulting engineers office specializing in pulp and paper mills. Address Box 45-469 care Paper Trade Journal. TF

TOUR BOSSES wanted for Roofing Felt Mills located in New Orleans and Metropolitan New York Area. Send complete resume giving experience, etc. to Box 45-491 care Paper Trade Journal. S-6

SALESMAN—Experienced folding cartons and boxboard specialties. Unusual opportunity in protected territory. In reply give complete resume of experience and personal status. Reply held in strictest confidences. Address Box 45-501 care Paper Trade Journal. A-30

SALES ENGINEER—Age 25-35. Preferably training pulp and paper industry. Willing travel. Good opportunity reliable firm. Address Box 45-492 care Paper Trade Journal. A-30

WANTED—Capable man with qualifications to take over operation of board mill as assistant superintendent with good prospects of being promoted to superintendent. This is a rare opportunity. Mill is located in Middle East. Address Box 45-497 care Paper Trade Journal. TF

WANTED—Experienced adjuster and machine tender for Lockport and National Paper Bag Machines, for flat and square bags. Plant in western New York. Address Box 45-498 care Paper Trade Journal. S-20

SALES MANAGER—Well established house in Philadelphia, Pa. wants man with paper experience and car to sell paper specialties to restaurants, hotels, institutions, luncheonettes, etc. Address Box 45-503 care Paper Trade Journal. S-13

SUPERINTENDENT for Rotogravure printing department. Applicant preferably to have experience in printing rotogravure on cellophane, glassine, as well as paper. List experience and personal data. Correspondence confidential. Address Box 45-509 care Paper Trade Journal. A-30

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THEY SHOULDN'T — AND WON'T — IF YOU INSTALL A HYDRAPULPER

Dilts hydrapulpers are this very hour disintegrating wet strength papers thoroughly and surprisingly fast in quite a number of mills.

1. When stock is all wet strength a thorough job can be done at relatively high speed.
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Again: Do wet strength papers give you trouble? Do you want to overcome the trouble? If so, we'll be glad to furnish the necessary information.

Address inquiries to Shartle Division or to Alexander Fleck, Ltd., Ottawa, Canada

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Divisions: Shartle Bros., Middletown, Ohio
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***Associate:* Alexander Fleck, Limited, Ottawa, Canada**

Dilts

HELP WANTED

MACHINE TENDER and Backtenders for an eastern tissue mill. Should be familiar with light weight tissues. References and experiences required. Address Box 45-512 care Paper Trade Journal. A-30

ESTIMATOR — Experienced in all phases of folding cartons, including paraffined cartons and specialties. Excellent opportunity for right person with one of this industry's most progressive firms. Write letter giving complete details in first letter, stating experience, age, draft status and salary expected. EMPIRE BOX CORPORATION, GARFIELD, N. J. A-30

WANTED—Manufacturing Agents for distribution of chemical product to pulp and paper mills. Several territories available in United States and Canada. Write fully on present lines and territory. Address Box 45-517 care Paper Trade Journal. S-20

SUPERINTENDENT — One cylinder machine tissue mill. Must be experienced on light weights and be able to handle help. Experience and references required. Address Box 45-511 care Paper Trade Journal. A-30

WANTED—Sales and Technical Service Representatives for New England and Middle Atlantic States to serve pulp and paper mills. Mill experience and bacteriological or chemical training desirable. Address Box 45-518 care Paper Trade Journal. S-20

SUPERINTENDENT — Squares, Flats, Sacks, S. O. Permanent position with progressive company. Write full details. Address Box 45-522 care Paper Trade Journal. S-6

WANTED—Two Paper Mill Engineers and two draftsmen experienced modern paper mill practise. Also two Mechanical Draftsmen. Permanent work for good men. THE CELOTEX CORPORATION, 205 W. Monroe Street, Chicago 3, Illinois. S-6

HELP WANTED

MIDWESTERN paper mill undertaking large post war development program, requires assistant paper mill engineer. Inquiries are invited. Address Box 45-532 care Paper Trade Journal. S-13

MERCHANDISE AND SALES MANAGER for nationally known paper bag manufacturing company seeking to develop sales of special purpose and transparent bags and flexible containers—opportunity—replies considered in strictest confidence—state experience and minimum compensation. Our employees aware of this advertisement. Address Box 45-529 care Paper Trade Journal TF

SALESMAN — Experienced transparent bags, flexible containers, special purpose bags and sacks. Salary and/or commission. Excellent opportunity. Address Box 45-530 care Paper Trade Journal. TF

SALES AND MERCHANDISE MANAGER for nationally known bag manufacturing company, seeking to develop sales of special purpose and transparent bags and flexible containers—opportunity—replies considered in strictest confidence—state experience and minimum compensation. Our employees aware of this advertisement. Address Box 45-528 care Paper Trade Journal. TF

WANTED — BOSS MECHANIC. We require an aggressive work organizer and one who can supervise a crew to get work done. We offer this man a good salary and a permanent position with a progressive company. Located in New York State. Address Box 45-525 care Paper Trade Journal. A-30

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CUTTERMAN with years of experience in a supervisory capacity, wishes a position with a good papermill. Can handle any sheet cutter and take charge of any sheet cutting department. Has a general knowledge of finishing room work.

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If you are interested in increased output, lower costs per ton, reduced waste, and greater efficiency in your finishing and shipping department I can help you. Results positively guaranteed. Nominal fee. Address Box 45-479 care Paper Trade Journal. A-30

SUPERINTENDENT—30 years experience in paper bag conversion of grocery, sacks and aniline or oil ink specialty bags. Capable of handling all bag shop problems. Thorough experience in supervision of help, maintenance and repairing of machines. Address Box 45-450 care Paper Trade Journal. A-30

BEATERROOM SUPERINTENDENT or foreman. 55 years old. 35 years theoretical and practical experience on most kinds of paper. Good on color. Address Box 45-484 care Paper Trade Journal. A-30

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BEATERS
2—3000 lb. Holyoke Iron Tub Beaters.
1—1000 lb. Dayton Beater.
2—400 lb. Gavit—iron tub beaters.

BLOWER
1—50" Buffalo. *Various other sizes.*

CALENDER STACKS
1—11-Roll 92" Face Calender Stack—complete with Drive.
1—86" 7-roll—Holyoke Machine.
1—77" 2-roll—Moore & White.
1—76" 8-Roll Farrel.

CENTRAP
1—Shartle Brothers Centrap.

CYLINDER MOULDS
1—48" Diameter x 96" Face.
8—30" diameter x 72" face.
2—30" diameter x 76" face.

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1—60 H.P. Fairbanks Morse Diesel Engine, connected to a 40 KVA Generator.

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1—D. O. James 75 H.P. Speed Reducer with couplings and motor base. Ratio 2.16 to 1. 900 RPM to 418 RPM.
1—Pulmax Drive.

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13—60" diameter x 154" face.
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24—36" diameter x 82" face.
1—24" diameter x 84" face. (Baby).
1—16" diameter x 84" face. (Baby).
1—36" diameter x 116" face.
2—28" diameter x 68" face.

EMBOSSER
1—28" two roll Embossing Calender.

ERKENSATORS
2—I. W. E. Erkensators—bronze construction—complete with motors, starters and distributing box.

FLAT SCREENS
2—8 plate Flat Screens.
1—18 plate Flat Screen, with scraper.
1—12 plate Flat Screen.
2—12 plate Packer Type Flat Screens with steel vats

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1—#2 Miami Jordan.
1—Pony Horne Jordan. Spare New Fillings.
1—Black-Clawson Jordan (belt driven).
1—#9 Emerson Jordan—for direct connection of a motor — requires use of 400 H.P. motor.
1—Smith & Winchester.

MOTOR
1—150 H.P. G. E. Induction Motor—3/60/220-875 r.p.m.—including starting equipment.

PULP EQUIPMENT
1—84" Carthage Chipper—complete and in excellent condition.
1—32" three pocket Glens Falls Grinder (for 27" wood).
3—Rotary incinerators—9' diameter x 20' long.
4—27" four pocket Sandy Hill grinders (for 24" wood—including 1000 H.P. motor for each, starting equipment, etc.).

PULPERS
1—#2 Lannoye Pulper.
1—Jones Pulper — direct connected to 60 H.P. motor—3 phase, 60 cycle, 440 volts —forward and reverse starting.

PUMPS
1—Buffalo Pump—5500 g. p. m., direct connected to 100 H.P. Motor (50' head).
1—Shartle Brothers duplex 10 x 20 stock pump.
1—Moore & White triplex 10 x 12 stock pump.
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.

REELS
1—2 Bowl Reel — 112" face — bowls 20" diameter.
1—2 Bowl Reel—63" face.
1—2 Bowl Reel—110" face.
1—2 Drum Reel—72" face.

REFINERS
2—#1 Claflin Refiners.

ROLLS
500—Brass tube—steel tube—rubber covered iron rolls—various sizes.

RUBBER COUCH ROLL
1—72½" Face x 9" diameter (soft rubber).

SAVEALLS
1—Shartle Bros. decker 36" diameter x 60" face, including couch roll.
1—Saveall 36" x 136" cylinder mold, antifriction bearing equipped, including couch roll.

SHREDDERS
1—#25 CRSE Mitts & Merrill Hog.
1—Gilman Shredder—used one year.

SHEETERS
1—103" Hamblet Single Knife Sheeter, complete with slitting device.
1—110" Horne single knife rotary sheet cutter.
1—48" Langston heavy duty chopper (this is a combination machine, combining a slitter, scorer, sheeter and chopper.)

SIZING MACHINE
1—36" Waldron sizing machine.

SLITTERS
1—114" Two drum Langston Slitter & Winder.
1—110" Beloit slitter (slitter attachment only).
1—114" Two drum Kidder slitter and winder.
1—36" Koegel slitter and winder.
1—72" Moore & White shaft winder.
1—4 Drum 108" trim Moore & White.

STEAM ENGINE
1—100 H. P. Ames Steam Engine connected to a 75 K. W. Westinghouse Generator.

SUCTION BOXES
1—Nash 100" face Suction Box.
3—Brass Suction Boxes—90" drilled face.
2—Brass Suction Boxes—77½" drilled face.

SUCTION COUCH ROLL
1—Sandusky Suction Couch Roll — 18" diameter x 130" face — Complete with Sturtevant Vacuum Pump and drive mechanism.

TOILET CONVERTERS
2—63" Dietz Toilet Converters.
1—81" Dietz Toilet Converter.

WINDERS
2—65" Cameron Tensions for Winders.

J. J. ROSS CO., 250 Frelinghuysen Avenue, Newark 5, New Jersey
TEL. BIGELOW 3-3720 A-30

We are always in the market to purchase your surplus or idle machinery. What have you to offer?

FOR SALE | FOR SALE | FOR SALE

Ross Paper Machinery Co., 17 Porter Ave., Newark 8, New Jersey, Waverly 3-5675

146" Pulp Drying Machine—200 ton per day drying capacity.

Prints and additional information on request.

BEATERS
1—2500 lb. Downingtown Iron Tub
1—750 lb. Downingtown Iron Tub
2—1000 lb. Horne Iron Tub
1—1200 lb. Holyoke Wood Tub

CALENDER STACKS
1—9 Roll Lobdell 124" Warren Doctors
1—10 Roll Farrell 104" Warren Doctors
1—11 Roll Pusey & Jones 104" Warren Doctors

CONVERTING EQUIPMENT
1—Bliss Double Head Stitcher
1—Bliss Single Head Stitcher
1—Bliss Box Assembling Machine
1—66" Dietz Towel Winder
4—Waterville Grinders
1—42" Parry Liner & Combiner
1—36" Waldron Reeling Machine
1—39" Dampening Machine
1—36" Brush Coating Machine
1—Copper Mixing Tank with agitator—40 gal.
1—Cast Iron Kettle 20" x 24" 2 outlets

DRYERS
5—48" diam.—102" face—2 deck frames.
40—36" diam. 86" face 3 deck frames
18—36" diam. 82" face 2 deck frames
40—28" diam. 96" face 2 deck frames

FESTOON DRYERS
100" Proctor & Schwartz
60" Proctor & Schwartz

FLAT SCREENS
1—Moore & White 8 Plate
1—Moore & White 10 Plate
2—Sandy Hill Packer 8 Plate with Scrapers.
1—Sandy Hill Packer 10 Plate
1—Trimbey Pulp Screen 30 ton cap.

JORDANS
1—E. D. Jones Standard motor drive
1—Dillon No. 2 Motor drive
1—Appleton No. 2 motor drive
1—Noble & Wood Monarch Belt Drive
1—Emerson No. 2 Belt Drive

KNIFE GRINDER
1—72" Seybold automatic used one year

MISCELLANEOUS
1—Warren Broke Target with pump
2—Yankee Dryer doctor oscillators (Beloit)
2—Nugent Oil Filters (new)
2—Beloit Fourdrinier Shakes
1—Oster Pipe Threading Machine 2" to 6" direct conn. to motor

MOTORS
1—30 h.p. 600 R.P.M. 2300 V. 3 Ph. 60 cy.
1—40 H.P. 3600 R.P.M. 2300 V. 3 Ph. 60 cy.

PLATERS
2—Holyoke 2 Roll 18" dia. 36" face

PULP EQUIPMENT
2—Pusey & Jones vertical Digesters (welded) 7' dia., 24' high 125 lb. pressure
8—Horizontal Digesters 15' diam. 47' face 150 lb. pressure
3—Improved No. 2 Knotters
1—Nichols-Herreshoff Lime Kiln
1—Williams No. 30 Bark Hog
1—Sumner Disc Barker 72" dia.

PULPERS
1—Sturtevant Bale Pulper with conveyor & motors used three years.
1—Voith Pulper No. 1-30 tons cap.

PUMPS
1—Pusey & Jones 5" x 8" Stock.
1—DeLaval 6" x 6"
1—Oliziti Acid 3" Suction.
1—Frederick 600 g.p.m. 50' head (stock)
1—Midwest 6" stock pump

REELS
2—Pusey & Jones 104" face 18" dia. bowls
1—Pusey & Jones 115" face 18" dia. bowls
1—2-bowl 109" face 20" dia. bowls

SATURATOR
1—Guyton-Cumfer 5 gates

SAVEALL
1—A. D. Wood cylinder 48" dia. 80" face
1—No. 4 Bird with motor and speed reducer 16" diam. rubber couch.

SHEETER
1—100" Hamblet Duplex with Reeves Drive

SLITTERS & WINDERS
1—104" Warren two drum.
1—72" Pusey & Jones two drum.

SPEED REDUCERS
1—Philadelphia ratio 60 to 1—5 H.P.
1—Philadelphia ratio 600 to 1—3 H.P.
2—Grant ratio 7 to 1 5 H. P.
1—Oliver ratio 51 to 5.1 5 H.P.
1—Cleveland ratio 47 to 1 23 H.P.

STUFF PUMPS
1—12" x 12" Goulds triplex
8—10" x 20" Shartle triplex
1—8" x 18" Shartle triplex
1—12" x 16" Shartle triplex
1—9" x 10" Shartle triplex
1—7" x 16" Shartle triplex
1—8" x 18" Shartle duplex

SUCTION FELT ROLLS
1—Downingtown 12" diam. 106" drilled face
1—Downingtown 10" diam. 106" drilled face

VACUUM PUMPS
1—14" x 20" Connersville
1—12" x 18" Connersville

WASHERS (Beaters)
1—54" face—45" diam. with rigging
1—52" face—52" diam. with rigging

WET MACHINE
1—84" Improved three roll Hydraulic Enclosed drive (used one year)

CASH PURCHASER OF ALL TYPES OF PAPER, PULP AND CONVERTING EQUIPMENT
WANTED—THREE CYLINDER AND TWO FOURDRINIER MACHINES FOR EXPORT—ANY WIDTH

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SUPERINTENDENT desires change. Experienced on tissues, kraft papers, news, etc. Address Box 45-495 care Paper Trade Journal. S-6

CHIEF CHEMIST with wide experience in southern kraft pulp and paper mills, desires a position as technical director or assistant manager with a progressive firm. Address Box 45-504 care Paper Trade Journal. S-6

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AVAILABLE — SALESMAN. Considering change, Thirty years manufacturing, distributing, selling, fine papers and other grades, seeks connection with mill or reputable jobber. Address Box 45-521 care Paper Trade Journal. A-30

TECHNICAL GRADUATE desires position as Plant Engineer. 17 years experience in mills with Sulphite, Bleach, Deinking Plants and facial, toilet, book, bond, Kraft specialties and jute board grades. Address Box 45-513 care Paper Trade Journal. S-6

CHEMIST—Ph. D. 16 years fundamental and applied research experience in sulfite and alkaline pulping, bleaching, dissolving pulps, papermaking, byproduct development. Desires supervisory position as research director, technical director or chief chemist in progressive company. Now employed. Address Box 45-534 care Paper Trade Journal. S-6

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One large Breaker Beater complete
One small Beater Complete
1—60" Diameter X 90" Face cylinder mold
1—4x3 Shartle Duplex plunger stock pump
1—New pair cast steel double suspension spring type beater bearings for 5" diameter journal—Noble & Wood beater roll. Never used
1—Used old style lighter beam for 5" diameter journal Noble & Wood beater
1—New reinforced design lighter beam for 5" diameter journal—Noble & Wood beater roll. Pattern No. 683. Never used.
2—300 KVA —33000-2300/4000 volts transformers
1—250 H.P. slip ring motors & controls—480 R.P.M.—3 bearing base and pulley
60—62" Face steel dryer felt rolls—1—7/16" journals
1—20" Face cast iron taper pulley—2 15/16" bore taper 31"x29½"
4—30" diameter x 60" face dryers
1—3" to 10" Cox & Sons Pipe threading machine
1—42"x42" Noble & Wood beater roll with filling installed
1—60" Noble & Wood impeller for circulation stock in beater.

A visit to the mill would prove profitable as we have many items for sale to numerous to mention. See our superintendent Mr. O. P. Fussell at our plant in Wallcomsac, New York.

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Mills: Wallcomsac, New York
Main Office: 25 Vanderbilt Avenue
New York 17, New York TF

FOR SALE ONE CALENDER STACK 6 Roll, Stack 110" face with drive complete. Bottom Roll 20" diameter; 1 Roll 14" diameter; 3 Intermediate Rolls 10" diameter; 1 Top Roll 16" diameter. These frames will accommodate 3 additional 10" Rolls. Address Box 45-506 care Paper Trade Journal. A-30

FOR SALE

PAPER CONVERTING NAPKIN MACHINES

Cornucopia—Model #10
¼ Fold—Model E
Jr. Dispenser Type

Completely automatic machines, used and in good condition. For complete details contact

ENTERPRISE PAPER COMPANY
435 N. Fifth Street
Phila. 3, Pa. A-30

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FOR SALE

PAPER MILL & PAPER CONVERTING EQUIPMENT FOR SALE

34" Inmas Slitter.
42" Fitzsching Cloth Slitter.
39" Sheridan Automatic Power Paper Cutter.
44" Seybold Holyoke Aut. mill type Power Cutter.
45" White Automatic Power Cutter.
50" Finley Sheeter.
110" Hamblet heavy duty Sheeter.
98" Rice Barton & Fales Slitter & Rewinder, for use on dry end of paper machines.
120" Moore & White 4-drum Rewinder.
New 62" Two-Roll Rack Stand, handling rolls up to 39" diameter.
4 Waldron 36" Paper Reelers
Baling Machines, both hand and power.

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New and guaranteed used steel pipe, boiler tubing, valves, fittings, wood and steel tanks, steel buildings

JOS. GREENSPON'S SON PIPE CORP.
NATIONAL STOCK YARDS, Illinois.
S-6

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A-30

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36" Diameter Dryers 85" and 86" Face — 3 Deck — Complete with Stands, Gears and Bearings.

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Garfield, New Jersey
TF

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Former Paper Mill Property centrally located only 222 miles from New York City. Excellent converting building and storehouse. Main buildings need repairs before installing new equipment. N. Y. Central R.R. siding at this plant and 1100 H.P. waterpower the year round. 550 H.P. now developed with electric generator. All water rights controlled by the owners. For further particulars write

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21 East 40th St., New York 16, N. Y.
A-30

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Ten dryers 49" dia. x 82" to 89" face, rebuilt, with frames, gears, bearings and new Johnson joints.
98" Rice Barton Calender, Vickery doctors and oil pressure system.

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1—59" Moore & White with layboy and backstand.
2—90" Hamblet with Moore & White layboy and backstand.
1—72" Finley cutter, with cast iron knife bar.

FRANK H. DAVIS COMPANY
175 Richdale Ave., Cambridge Mass. S-13

FOR SALE

FOR SALE

1—Standard Horne Jordan with new shell and plug fillings.
1—200 lb. Valley Iron Works high speed Beater of the Holland type. A-1 condition.
1—Knowlton Spiral Core Machine complete with 36" Langston Recutter. Immediate delivery.
1—7-roll 45" wide Holyoke Super Calender Stack, complete with 50 H.P. G. E. a.c. 3 phase 60 cycle, 220 volt motor equipment. Machine in perfect condition.
1—24" Left Hand 4 Knife Carthage Chipper with two new sets of knives.
1—22 Lamson Pulper complete with 40 H/P A.C. motor equipment. A-1 condition.
1—110" Double-Drum Waldron late type shear cut hydraulic Slitter and Rewinder.
1—Type FC International Folding Paper Box Machine Co.'s Folding and Gluing Machine. Range of sizes on folded cartons 2¾" to 10" when folded flat and 3" to 30" long.
1—30" Standard Waldron Embossing Machine with Levant pattern.
1—20" wide Paper Converting Co.'s machine for automatically winding rolls of decorated crepe tissue paper.
1—18" x 37" Standard Sheridan Die Press with motor. Rebuilt and guaranteed.

GIBBS-BROWER COMPANY, INC.
21 East 40th St., New York 16, N. Y.
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FOR SALE

1—Vacuum Filter

Address Box No. 45-514 care Paper Trade Journal. S-6

FOR SALE

One 99" nine roll calender stack.

Address Box No. 45-516 care Paper Trade Journal. S-6

FOR SALE—One No. 97 Davidson suction feeder with ¼ H.P.D.C. Motor. Perfect condition. Bargain. Address Box 45-456 care Paper Trade Journal. A-30

FOR SALE—1 Hamilton-Corliss Variable Speed Twin Engine, size of cylinders 12" x 24". Also Triple-Deck Frames for ninety 36" dryers, any width. The Chesapeake Paperboard Co., Baltimore, 30, Md. TF

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FOR SALE—Complete Pulp and Paper Mill. Earning fine profit. Excellent condition. Information given to principles only. Address Box 45-489 care Paper Trade Journal. S-6

FOR SALE—6—Oliver BRAND NEW 8' x 6' Rotary Filters or Dewaterers; Valley Iron Works 100 lb. Beater; Robinson 30" Refiner with 2—40 HP AC motors; Krupp Beater Mill or Pulp Disintegrator, with 40 HP AC motor. WANTED: EVAPORATORS, DRYERS, FILTERS. BRILL EQUIPMENT COMPANY, 225 West 34th Street, New York 1, N. Y. A-30

FOR SALE—38" Oswego Automatic Clamp Cutter, fully rebuilt and guaranteed. Address Box 45-524 care Paper Trade Journal. A-30

FOR SALE—Several Cameron Style 6—Slitting and Rewinding Machines. SLATER BROTHERS, INC., 460 Totowa Ave., Paterson, New Jersey. Lambert 5-1880. A-30

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FOR SALE

FOR SALE

1—DeLaval Steam Turbine—60 to 75 H.P., 125 to 250 lbs. steam pressure, 5 to 25 lb. back pressure. Ideal where processing steam is required.
1—Deane Triplex Pump—Size 5½ x 8 with 15 H.P. motor.

KEATING EQUIPMENT COMPANY
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Telephone REctor 2-8353 S-6

WANTED

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WANTED — DISCARDED PAPER MILL FELTS. HIGHEST PRICES paid for all kinds of discarded paper mill felts. LARGE or SMALL QUANTITIES accepted. Prices quoted immediately on receipt of samples. ADDRESS: GLASER AND YOFFE, INC., 80 NORTH MAIN ST., NATICK, MASS. TF

WANTED—1—36" Diameter x 90" to 93" Face Cylinder Mold. Address Box 45-461 care Paper Trade Journal. A-30

WANTED—One Rag Cutter, in good condition. Hawley Products Canada Ltd., Brantford, Ontario, Canada. S-6

WANTED—Brightwood Box Machine. Address Box 44-836 care Paper Trade Journal. tf

WANTED—W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic Presses, Sheridan Presses, Dryers. Address Box 44-835 care Paper Trade Journal tf

ROLL GRINDER WANTED—Must be in good condition. Minimum 30" diameter, 19' between centers, and take a 4" face wheel. Must have crowning attachment. FORT HOWARD PAPER COMPANY, Green Bay, Wisconsin. S-6

WANTED—Used Tensile Testing Machine with elongation scale. Capacity 1000 grams. Motor drive preferred. State make, details and price. Address Box 45-523 care Paper Trade Journal. A-30

WANTED—Paper Machine Dryer, Heavy Duty Pulley or Engine Flywheel 56" to 60" face, 42" to 54" diameter. Plastic Film Corporation, Plainfield, Connecticut. S-13

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FOR SALE

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1—45" calender stack, 3 rolls
1—88" " " 9 rolls
1—104" " " 11 rolls
1—104" " " 7 rolls
2—108" " " 11 rolls
1—108" " " 9 rolls
1—108" " " 7 rolls
1—120" " " 10 rolls
1—124" " " 11 rolls
1—143" " " 11 rolls

ENGINES—VARIABLE SPEED

2—10 x 15 American Ball
1—12 x 12 x 14 Brownell
3—14 x 14 x 16 Erie Ball
1—15½ x 15½ x 16 Ames

BEATERS

1—61 x 60 Midwest high speed
1—64 x 54 " " "

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1—34 x 24—good bars. Price $200.00
2—46 x 39—good bars. Price $350.00 each
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2—54 x 60—good bars. " $600.00
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1—56 x 40— " " " $300.00
1—66 x 60—good bars. " $850.00

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2—44 x 44
2—46 x 58

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3—pair Noble & Wood heavy duty
1—pair E. D. Jones heavy duty
1—pair Dayton Beater heavy duty

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2—Black-Clawson #2 Bahr type
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4—Miami #6
2—Miami #2
1—Jones Imperial
2—Jones Majestic
1—Mammoth Jr.
2—Noble & Wood Monarch
1—Noble & Wood Pony
1—#2 Dillon

JORDANS

2—Black-Clawson #2
1—Shartle Miami #2
2—Noble & Wood Mammoth Jr.
1—E. D. Jones Imperial

JORDAN FILLING

2—Sets Bolton shell filling for Noble & Wood Monarch
Several sets Bahr Bros. shell fillings, various make jordans.

PAPER MACHINES

1—109" Fourdrinier Machine

MISCELLANEOUS ITEMS

1—Permutit Water Softener
2—Black-Clawson #2 Jordans
2—14' Globe Rotaries
2—Cradles (for holding plates) Bird #2 screen
1—114" Warren winder
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1—72" Erie Layboy
14—dryers 60 x 178 with anti-friction bearings
1—116 Moore & White 4-drum winder for 60" diameter rolls
12—split & collapsible winder shafts for Moore & White winder

SHARTLE BROTHERS MACHINE CO.

Middletown, Ohio.

S-6

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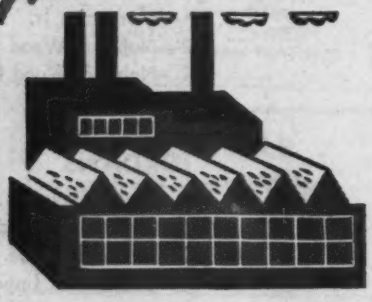
To your Industry

and your Employees



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Arabol Mfg. Co.
National Adhesives Division of National Starch Products, Inc.
Philadelphia Quartz Co.
Stein, Hall & Co., Inc.
United States Rubber Co.

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Dorr Company
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Montague Machine Co.
Moore & White Co.
Noble & Wood Machine Co.
H. K. Porter Company Inc.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

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Thomas W. Hall Co., Inc.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Weber, Herman G.

BARKERS AND CHIPPERS
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Appleton Machine Co.
Carthage Machine Co.
Fibre Making Processes, Inc.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

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E. D. Jones & Sons Co.
The Moore & White Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Simonds Worden White Co.
Valley Iron Works Co.

BEARINGS
Black-Clawson Company
Jones, E. D. & Sons Co.
The Manhattan Rubber Mfg. Co
Montague Machine Works
Rollway Bearing Co.
Shartle Brothers Machine Co.
Shenango-Penn Mold Co.
SKF Industries Inc.
Timken Roller Bearing Co.
Valley Iron Works Co.
T. B. Woods' Sons Company

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The Appleton Machine Co.
Black-Clawson Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Herman Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
J. J. Ross Company
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works

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Dilts Machine Works Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
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Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Simonds Worden White Co.
Valley Iron Works Co.

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Graton & Knight Company
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
J. E. Rhoads & Sons
United States Rubber Co.
T. B. Wood's Sons Company
Worthington Pump & Machinery Corp.

BLEACHING APPARATUS
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Perkins & Sons, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
Noble & Wood Machine Co.
Pennsylvania Salt Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Montague Machine Co.
Moore & White Co.
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Farrel-Birmingham Co., Inc.
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Black-Clawson Company
Perkins & Son, Inc., B. F.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Waldron Corp., John

CASEIN
Packing Products Co.

CASTINGS
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Black-Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Fort Pitt Steel Casting Co., Div. H. K. Porter Company, Inc.
The Frederick Iron & Steel Co.
Grinnel Company
Hamblet Machine Co.
E. D. Jones & Sons Co.
Lobdell Car Wheel Co.
Magnus Metal Corp.
Montague Machine Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Shenango-Penn Mold Co.
Smith & Winchester Mfg. Co.
Traylor Engineering & Mfg. Co
Union Machine Company
Union Screen Plate Co.
Valley Iron Works Co.
Walworth Company

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Bird Machine Co.
De Laval Steam Turbine Co.
Nichols Engrg. & Research Corp
Ross J. O. Eng. Co.
Shartle Brothers Machine Co.

CHEMICALS
Amer. Cyanamid & Chem. Corp
American Resinous Chemicals Corp.
Ansul Chemical Co.
Calco Chemical Co.
Diamond Alkali Co.
Dispersion Process Inc.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuff Corp.
Geigy Co., Inc.
Gottesman & Co.
Hooker Electrochemical Company
The Mathieson Alkali Works, Inc.
Monsanto Chemical Company
National Oil Products Co.
Naugatuck Chemical Div. of U. S. Rubber Co.
Niagara Alkali Company
Paper Makers Chemical Department, Hercules Powder Co.
Pennsylvania Salt Mfg. Co.
Pioneer Salt Company
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
Stauffer Chemical Company
United States Rubber Co.
Witco Chemical Co.
Wyandotte Chemicals Corp.

CLEANING MATERIALS
Amer. Cyanamid & Chem. Corp.
Bird Machine Co.
E. I. du Pont de Nemours & Co., Inc.
Paper Makers Chemical Department, Hercules Powder Co.
Magnus Chemical Co.
Nichols Engrg. & Research Corp.
Oakite Products, Inc.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
Wyandotte Chemicals Corp.
J. B. Ford Division

CLUTCHES
Appleton Machine Co.
Black-Clawson Company
Hudson Sharp Machine Company
Farrel-Birmingham Co.
Fawick Airflex Co., Inc.
Horton Manufacturing Co.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Stearns Magnetic Mfg. Co.
Valley Iron Works Co.
T. B. Wood's Sons Company

COATERS
Horton Mfg. Co.

COATING MACHINERY
Hudson Sharp Machine Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corporation, John
Weber, Herman G.

COMPRESSORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
Ingersoll-Rand Co.
Nash Engineering Co.
Worthington Pump & Machinery Corp.

CONSTRUCTION ENGINEERS
Merritt-Chapman & Scott Corp.

CONSULTING ENGINEERS
W. H. L. D. Betz
Frederic C. Clark
Ferguson, Hardy S.
Hardy, George F.
Johnson & Wierk, Inc.
The Kohler System Company
Main, Inc., Chas. T.
J. E. Sirrine & Co.
Stone & Webster Engrg. Corp.

CONTROLS
The Bristol Company

CONVEYORS
Black-Clawson Company
Murray, D. J. Mfg. Co.
Ross Engineering Corp., J. O

CORES
Elixman Paper Co.
Sonoco Products Co.
Rodney Hunt Machine Co.
Montague Machine Co.
Smith & Winchester Mfg. Co
Walker-Goulard-Plehn Co.

COUPLINGS
Black-Clawson Company
De Laval Steam Turbine Co
Farrel-Birmingham Co., Inc.
The Frederick Iron & Steel
E. D. Jones & Sons Co.
Lovejoy Flexible Coupling Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John
Westinghouse Electric Corporation
T. B. Wood's Sons Company

CUTTERS
Thomas W. Hall Co.
Noble & Wood Mach. Co.
Perkins & Son, Inc., B. F.
The Smith & Winchester Mfg Co
Taylor Stiles & Co.

DAMPENERS
Perkins & Son, Inc., B. F.
Valley Iron Works Co.

DE-INKING
Kinsley Chemical Co.

DIGESTERS
H. K. Porter Company Inc.
Pusey & Jones Corp.

DOCTORS
Bird Machine Company
Black-Clawson Company
Downingtown Mfg. Co.
Lobdell Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

DOCTOR BLADES
Black-Clawson Company
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers
United States Rubber Co.
Westinghouse Electric Corporation

DRIERS
Black-Clawson Company
Murray Mfg. Co., D. J.
J. J. Ross Company
Ross, J. O. Engineering Corp.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Traylor Engineering & Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
Black-Clawson Company
Davis, Frank H., Co.
De Laval Steam Turbine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
General Electric Company
Horton Manufacturing Co.
Rodney Hunt Machine Co.
Montague Machine Co.
Moore & White Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
T. B. Wood's Sons Co.
Valley Iron Works Co.
Westinghouse Electric Corporation

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
Fibre Making Processes, Inc.
E. D. Jones & Son Co.
Moore & White Co.
Noble & Wood Machine Co
Norwood Engrg. Co.
D. J. Murray Mfg. Co.

DYESTUFFS
Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co
Geigy Co., The
General Dyestuff Corp.
National Aniline Division, Allied Chemical & Dye Corp.
Paper Makers Chemical Department, Hercules Powder Co.
C. K. Williams & Co.
Witco Chemical Co.

EQUIPMENT INSTALLATION
Merritt-Chapman & Scott Corp.

EVAPORATORS
Black-Clawson Company
Goslin-Birmingham Mfg. Co., Inc
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.
Traylor Engineering & Mfg. Co.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Builders-Providence, Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
Traylor Engineering Co
Wallace & Tiernan

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
Bulkley, Dunton Pulp Co. Inc
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills Inc
Morey Paper Mill Supply Co
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.
Woodward, Baldwin & Co.

FELT GUIDES
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
American Colloid Co.
Amer. Cyanamid & Chem Corp
American Resinous Chemicals Corp.
W. H. Loomis Talc Corp.
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS
Moore & White Co.
J. O. Ross Engrg. Corp.
Worthington Pump & Mchy. Corp
Witco Chemical Co.

FLOORING, GRATING & TREADS
Hendrick Mfg. Co.
Norton Co.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

FORMING MACHINES
Downingtown Mfg. Co.
Noble & Wood Machine Co.
Oliver United Filters
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

WHERE TO BUY

GRABS
Black-Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

GRINDERS
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Simonds Worden White Co.
United States Rubber Co.

HEATING, VENTILATING AND AIR CONDITIONING
The Appleton Machine Co.
Armstrong Machine Works
Fibre Making Processes, Inc.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Valley Iron Works Co.
Worthington Pump & Mchy Corp.

HOISTS
Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.

HOSE (Air, Water, Suction, etc.)
The Cincinnati Rubber Mfg. Co.
The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan Inc.
United States Rubber Co.

INSTRUMENTS, TESTING AND MEASURING
W. H. & L. D. Betz
N. P. Bowsher
The Bristol Company
Builders-Providence, Inc.
The Foxboro Company
General Electric
W. & L. E. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taber Instrument Corp.
Taylor Instrument Cos.
Wallace & Tiernan Co., Inc.

JORDAN FILLINGS
Appleton Machine Co.
Behr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black-Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Simonds Worden White Co.
Valley Iron Works Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
W. H. & L. D. Betz
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Taber Instrument Co.
Taylor Instrument Companies
Valley Iron Works Co.

LAY BOYS
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers

LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

LUBRICATORS
Hills-McCanna Co.

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Walker-Goulard-Plehn Co.

MIXERS
H. K. Porter Company
Youngstown Welding & Engrg. Co.

MOISTENING EQUIPMENT
The Spray Engineering Co.

MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Co.
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation

PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.

PACKING
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester

PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Meostaque Machine Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPERMILL BUILDERS
Merritt Chapman & Scott Corp.

PAPER TUBE MACHINERY
Dietz Machine Works
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.

PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Waldron Corp., John

PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.

PIPE
Black-Clawson Company
Crane Company
Grinnell Company
Shartle Brothers Machine Co.
Taylor Forge & Pipe Works
Walworth Company
Youngstown Welding & Engrg. Co.

PLATERS
Perkins & Son, Inc., B. F.

PLATES
Black-Clawson Company
Hendrick Mfg. Co.
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.

PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.

PRESSES
Black-Clawson Company
Farrel-Birmingham Co.
Dietz Machine Wks.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Rotogravure Engineering Co.
Shartle Brothers
Valley Iron Works Co.
Waldron Corp., John
Weber, Homer C.

PUG MILLS
Traylor Engineering & Mfg. Co.

PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gerresmaa & Co., Inc.
Ilof Hansson, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd
Pulp and Paper Trading Co.

PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Dorr Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Frederick Iron and Steel Co.
Hills-McCanna Co.
Ingersoll-Rand Co.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Noble & Wood Machine Co.
Paper Converting Mch. Co.
Quimby Pump Co. Div. of H. K. Porter Company, Inc.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Warren Steam Pump Company
Worthington Pump & Machinery Corp.

RECOVERY SYSTEMS
Bulkley, Dunton Pulp Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones
Ross Engineering Corp. J. O.
Valley Iron Works Co.

RECTANGULAR BINS
Traylor Engineering & Mfg. Co.

REELS
Black-Clawson Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hudson Sharp Machine Company
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Rodney Hunt Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Behr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
The Hermann Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout, Waldron & Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
The Bristol Company
The Brown Instrument Co.
The Foxboro Company
Jones, E. D., & Sons Co.
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Shartle Brothers
Taylor Instrument Companies
Wallace & Tiernan
Westinghouse Electric Corporation

RESINS
American Cyanamid & Chemical Corp.
American Resinous Chemicals Corp.
The Resinous Products & Chemical Co.

ROLLS
Appleton Machine Co.
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Improved Paper Machy. Corp.
Lobdell Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Perkins, B. F., & Sons Co.
Pusey & Jones Corp.
Roehlen Engraving Co.
J. J. Ross Company
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Shenango-Penn Mold Co.
Sinclair Co.
Smith & Winchester Mfg. Co.
Stearns Magnetic Mfg. Co.
United States Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Cincinnati Rubber Mfg. Co.
Youngstown Welding & Engrg. Co.

ROLL STANDS
Cameron Machine Co.
Johnstone Eng. & Machine Co
The Kohler System Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co

ROTARY KILNS
Traylor Engineering & Mfg. Co

SATURATING MACHINES
Black-Clawson Company
Moore & White Co.
Noble & Wood Machine Co
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co
Waldron Corp., John
Weber, Herman C.

SCALES
Builders-Providence, Inc.
Merrick Scale Mfg. Co.

SCREEN PLATES
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Merey Paper Mill Supply Co.
Union Machine Co.
Union Screen Plate Co.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Co.
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co
Hendrick Manufacturing Co
E. D. Jones & Sons Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Traylor Engineering & Mfg. Co
Valley Iron Works Co.

SCRUBBERS
Traylor Engineering & Mfg. Co

SHEET MACHINES
Thomas W. Hall Co.
The Hermann Manufacturing Co
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
Valley Iron Works Co.

SHOWER PIPES
Bird Machine Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
Moore & White Co.
Shartle Bros. Mach. Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.

SIZING
American Cyanamid & Chemical Co
American Resinous Chemicals Corp.
Black-Clawson Company
The Dow Chemical Co.
du Pont, E. I., de Nemours & Co
National Oil Products Co.
Paper Makers Chemical Department, Hercules Powder Co.
Pioneer Salt Company
Socony-Vacuum Co.
Philadelphia Quartz Co.

SLITTERS
Black-Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Company
Johnstone Eng. & Machine Co.
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

SPRAY NOZZLES
The Spray Engineering Co.

STAINLESS STEEL
Allegheny Ludlum Steel Co.
Eastern Stainless Steel Corp.
Industrial Steels, Inc.

STARCH
American Cyanamid & Chemical Corp.
Chiston Co.
National Starch Products, Inc.
Stein, Hall & Co., Inc.

WHERE TO BUY

STEAM SPECIALTIES
Johnson Corp.
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

STRAINING & STRAPPING MACHINES
Acme Steel Company
The Stanley Works

STUFF CHESTS
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

SUCTION BOXES
Black-Clawson Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Westinghouse Electric Corp.

SULPHUR
American Cyanamid & Chemical Corp.
Stauffer Chemical Company
Texas Gulf Sulphur Co.
Witco Chemical Company

SULPHUR BURNERS
Valley Iron Works Co.

TALC
American Cyanamid & Chemical Corp.
W. H. Loomis Talc Corp.
International Talc Company

TANKS
Frederick Mfg. Co.
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
The Noble & Wood Machine Co.
H. K. Porter Company Inc.
Rodney Hunt
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Traylor Engineering & Mfg. Co.
United States Rubber Co.
Waldron Corp., John
Youngstown Welding & Engrg. Co.

THICKENERS, DECKERS & SAVEALLS
Bird Machine Company
Bulkley, Dunton Pulp Co. Inc.
Carthage Machine Co.
Dilts Machine Works
Dorr Co.
Downingtown Mfg. Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

TITANIUM
E. I. Du Pont de Nemours & Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.
Witco Chemical Company

TOOLS
Acme Steel Company
Ingersoll-Rand Co.
The Stanley Works
Walworth Company

TRUCKS
Automatic Transportation Co.
Elwell Parker Electric Co.
Wright-Hibbard Ind. Elec. Truck Co.

TRAPS
Armstrong Machine Works
Crane Co.
Grinnel Company
Johnson Corporation
Shartle Bros. Mch. Co.

TURBINES
Rodney Hunt Machine Co.
Noble & Wood Machine Co.
Shartle Brothers
Valley Iron Works Co.

TURBINES
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Company
Hunt, Rodney, Mach. Co.
Westinghouse Electric Corp.
Worthington Pump & Machinery Corp.

USED EQUIPMENT
Frank H. Davis Company
Gibbs-Brower Co.
Thomas W. Hall Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Shartle Brothers Machine Co.

VALVES
The Bristol Company
Crane Company
Dilts Machine Works
Fibre Making Processes, Inc.
The Foxboro Company
Hills-McCanna Co.
E. D. Jones & Sons Co.
Kennedy Valve Mfg. Co.
Magnus Metal Corp.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Permutit Company
William Powell Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Taylor Instrument Companies
Valley Iron Works Co.
Walworth Company

VATS & VAT PARTS
Union Machine Co.
Union Screen Plate Co.

WASHERS
Bird Machine Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

WATER CONDITIONING
The Permutit Company

WAXING MACHINERY
Black-Clawson Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

WELDING EQUIPMENT
Allis-Chalmers Mfg. Co.
General Electric Company
Walworth Company
Westinghouse Electric Corp.

WET MACHINES
Black-Clawson Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Moore & White Co.
Montague Machine Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

WINDERS AND REWINDERS
Black-Clawson Company
Cameron Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co.
Hudson-Sharp Mach. Co.
Langston Co., Samuel M.
Johnstone Eng. & Machine Co.
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Rotogravure Engrg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Waldron Corp., John

WIRES
Appleton Wire Works
Black-Clawson Company
Bulkley, Dunton Pulp Co. Inc.
Cheney Bigelow Wire Works
Hayden Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Shartle Brothers Machine Co.

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